

IN THE DISTRICT COURT OF OKLAHOMA COUNTY
STATE OF OKLAHOMA

Jean Bookout; Charles Schwarz,
individually and as Personal
Representative of the Estate of
Barbara Schwarz, deceased;
Richard Forrester Brandt, as
Personal Representative of the
Estate of Barbara Schwarz,
deceased,

Plaintiffs,

vs.

Toyota Motor Corporation; Toyota
Motor Sales, U.S.A., Inc.;
Toyota Motor Engineering and
Manufacturing North America,
Inc.; Aisan Industry Co., Ltd.,

Defendants.

Case No. CJ-2008-7969

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TRANSCRIPT OF AFTERNOON TRIAL PROCEEDINGS

HAD ON THE 11TH DAY OF OCTOBER, 2013

BEFORE THE HONORABLE PATRICIA G. PARRISH,

DISTRICT JUDGE

Reported by: Karen Twyford, RPR

***** THIS TRANSCRIPT HAS NOT BEEN PROOFREAD *****

APPEARANCES

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1 (Whereupon, the following trial proceedings were had
2 on the afternoon of the 11th day of October, 2013, to wit:)

3 MR. CLARK: Your Honor, I have one of them. I've
4 got Mr. Ishii's CV. Plaintiffs have it numbered as 3104.

5 THE COURT: So you want to make it Plaintiffs'
6 3104?

7 MR. CLARK: We agreed to introduce it in lieu of
8 hearing any more of his qualifications.

9 THE COURT: Okay. I will introduce it as
10 Plaintiffs' Exhibit No. 3104.

11 MR. CLARK: I think that was probably a good
12 agreement.

13 MR. BAKER: We offer 3108. That is the only one
14 that we will offer.

15 MR. CLARK: Your Honor, at this point we have
16 foundation and 403 objections to that because of the amount
17 of testimony from Mr. Ishii that he couldn't understand
18 things in there. I think once Mr. Kawana has testified we
19 won't have additional objections beyond the ones that the
20 court has already ruled on. That hasn't happened yet.

21 THE COURT: Is Mr. Kawana going to testify?

22 MR. BAKER: Your Honor, he testified to Mr. Ishii
23 that is a Toyota document from a Toyota presentation as a
24 corporate representative, so that sets the foundation that
25 we need.

1 MR. CLARK: However, the fact that it may be a
2 Toyota document does not take care of the 403 issue.

3 THE COURT: The relevancy?

4 MR. CLARK: This issue is that there is a variety
5 of testimony from Mr. Ishii that he doesn't understand some
6 of the things in there. I think we need to hear from Mr.
7 Kawana because it goes to the jury.

8 THE COURT: Is Mr. Kawana going to testify?

9 MR. BAKER: I doubt it. You already ruled on this
10 in motions in limine that it would be relevant.

11 MR. CLARK: Well, we didn't know who was going to
12 testify at the time she ruled on the motions in limine.

13 THE COURT: And this is the document that he
14 testified about was prepared by Toyota and did all the
15 testimony at the end of his deposition?

16 MR. BAKER: Yes.

17 THE COURT: Then I will admit over your additional
18 objection, and your other objections, Plaintiffs' Exhibit
19 No. 3108.

20 (Whereupon, the jury returns to the courtroom.)

21 THE COURT: We're back on the record in Case No.
22 CJ-2008-7969. Mr. Koopman, you can come back to the stand.
23 Sir, you're still under oath. And Mr. Portis, you can
24 continue your direct examination.

25 Q (By Mr. Portis) All right. When we left for lunch

1 -- have you ever taught after lunch before?

2 A I teach every week after lunch twice. It's tough.

3 Q All right. Well, I want us to talk about this very
4 briefly just to get us back on point. Any safety critical
5 system with a single point failure is unsafe; is that true?

6 A That is correct.

7 Q It is defective?

8 A Yes, it is defective. Specifically as a defective
9 design.

10 Q And describe for us briefly how you get rid of the
11 single point failure.

12 A The only way to get rid of a single point of failure
13 is to have two pieces that check each other or take over for
14 each other. You have to two completely independent ways of
15 making the system. If there is any shared resource,
16 anything shared, then it is unsafe.

17 Q And that's where you got into that picture back there
18 on the jet engine, right?

19 A Right. On the jet engine, what was shared was the
20 computer on one engine could turn off both fuel pumps so
21 that was the single point of failure.

22 Q Now, your opinion that a single point of failure is
23 unsafe, is that shared in the academic community?

24 A Absolutely.

25 Q Is it clear that at the time that this software was

1 designed on the 2005 Toyota, prior to 2005, that the single
2 point of failure existed?

3 A I'm not quite sure what you mean by "existed."

4 Q Okay. Was it part of the system designed into the
5 system, the 2005 system, would that have been before the car
6 was actually manufactured?

7 A Yes. It was -- part of the design process was to
8 design a system which has an inherent single point of
9 failure. And then all cars manufactured would have that
10 same single point of failure because it is a design defect.

11 Q Now, you say this and then I want to go to the next
12 slide. And I think maybe here you say NASA agrees that the
13 ETCS has a dangerous single point of the failure. Do you
14 see that?

15 A Yes, I do.

16 Q That is one of your opinions, right?

17 A Yes. That is my opinion.

18 Q And on the next slide, that you have you talk about a
19 fault tree analysis.

20 A Yes.

21 Q Why did you do that?

22 A What I would like to do in these few slides is to
23 give a more detailed rigorous way of explaining what I mean
24 by an arbitrary fault and how single points of failure work.
25 So when you analyse a system for safety, and this can happen

1 during design, or this example is actually a NASA accident
2 investigation.

3 One of the techniques is called a fault tree. What
4 you do is you say, Here is a bad thing that could happen.
5 In this example it is a spacecraft that lost a bunch of
6 fuel, but in this case it might be unintended acceleration.
7 And what you do is you go down and there are "or" gates and
8 "and" gates. This is just computer terminology. What
9 you're looking for is anything at the bottom like a bad
10 algorithm or a corrupted data structure.

11 You see it only goes -- any one of these can cause
12 a software problem. Any one of these software or hardware
13 can cause a computer error. Any one of these can cause the
14 bad thing. So to make a system safe, you need at least one
15 and gate between the top and the bottom to make sure that
16 two different things have to go bad.

17 Q You said you need at least one?

18 A And gate.

19 Q And, A-N-D?

20 A Both have to fail. And if you don't have that, then
21 you have a single point of failure. One thing fails, the
22 whole thing goes bad. In this spacecraft, they actually had
23 a software problem that wasn't mitigated and they almost
24 lost the mission.

25 Q All right. What is a fault containment region?

1 A So a fault -- this ties into a fault containment
2 region, and I will tie these two concepts together quickly.
3 A fault containment region is a part of the computer,
4 typically computer hardware, that a fault outside it can't
5 affect inside, and a fault inside can't go out. So it is a
6 barrier that if a bit-flips or there is a software defect,
7 this barrier keeps all the bad stuff in so it can't corrupt
8 something else. It keeps all the bad stuff out so it will
9 keep working.

10 Q Hence, the word containment. In other words, your
11 fault is contained in a specific region so it doesn't
12 corrupt everything; is that right?

13 A Right. It is a big mote, nothing gets across mote,
14 particularly no faults get across the mote. Good data gets
15 across but not false.

16 Q And false tolerance requires having more than one
17 fault containment region; is that fair?

18 A That's fair. Once a fault happens, it can do
19 anything that it wants inside but it can't affect another
20 one.

21 Q So what is the problem with the Toyota design?

22 A Even though they have two chips, both chips are in
23 the same fault containment region. So a safe design would
24 have two chips, and each one is its own fault containment
25 region. What you do is you would have separate inputs.

1 Because no one has ever made a CPU that doesn't fail.

2 A safe design has two inputs. Each fault
3 containment region has its own input, and then they cross
4 check against each other. This means a fault in one can't
5 affect the fault in another.

6 Q Now, we heard Mr. Ishii say that Toyota had their own
7 standards that they follow, right?

8 A Yes. We heard that.

9 Q And when he says that, if they allow, if their
10 standards allow there to be -- for there not to be redundant
11 fault containment regions, would you say that is acceptable
12 in the industry?

13 A I would say it is unacceptable and leads to unsafe
14 systems.

15 Q Would that be contrary to MISRA?

16 A Yes, it would.

17 Q Contrary to any other standards?

18 A It would be contrary to every safety standard that
19 I've ever seen. So in order to build a safety critical
20 system, you need two fault containment regions so that if
21 one of them messes up, it can't affect the other one. Each
22 one has to have its own set of inputs because you can't
23 trust the other guy to tell you the truth about the inputs.

24 Q Well, you notice up here you use the word critical?

25 A Critical. Yes.

1 Q Is redundancy required for noncritical systems?

2 A Redundancy -- well, let me clarify critical.
3 Critical means safety critical. There is a broader concept
4 that maybe if you have a economic loss, like a chemical
5 processing plant blows up but no one is hurt, it is still a
6 critical system, so you see it is used there as well.

7 But in a critical system, if you're critical that
8 there is an unacceptable loss if there is a system failure
9 you have to have two fault containment regions or you don't
10 meet the accepted practices.

11 Q Now, this diagram right here, can you describe how
12 these two computers cross check everything.

13 A This are several ways that can cross check. This is
14 how the rails guys do it, this is how the chemical
15 processing guys do it, the aviation guys do it this way.
16 what they do is they take the inputs. The first thing they
17 do is they say, Hey, I have got this value of an input, what
18 did you get? And they exchange the input values. And
19 either one of them can say, what I saw isn't what the other
20 guy told me.

21 It is common in these systems if you see one input
22 the other guy tells you something else, you kill both of
23 them. They both take each other out, and the system does a
24 shutdown or it reverts to another pair next to each other to
25 resume operation.

1 Q Let's be specific here. Let's talk about a Toyota UA
2 event.

3 A Okay.

4 Q If this system was in place, how does it work?

5 A So it would look at the accelerator pedal. If the
6 two inputs from the accelerator pedal weren't within a very
7 small difference of each other, because nothing is ever
8 perfect, if they work -- I will just make up some
9 illustrative numbers -- if one input said 15 degrees and one
10 said 16 and one are assuming one degree is okay -- I'm not
11 opining on that -- then they would say, Oh, mine is 15, you
12 said 16, close enough, we're good.

13 And the other guy said, Mine says 16, but you told
14 me 30. Sorry. That's not right. I'm going to shut
15 everything down. Also with the throttle position, it also
16 is duplicated. And if the throttle position doesn't match,
17 it would shut everything down.

18 So what they do is they periodically run an
19 internal computation and if what they think is going on
20 doesn't match, they shut everything down.

21 Q What do you mean by shut everything down?

22 A Typically they would reset both processors, depending
23 on the system, they would reboot and try to restart or in
24 some systems like rail system, they shut themselves down,
25 and a person has to come and restart them. They can do that

1 on rail because they have another pair next to it, and the
2 other pair takes over.

3 Q Is that a safer system?

4 A If you shut down and require manual intervention, it
5 is safer if the system is safe when it stops. In an
6 airplane engine, you try to restart them. And a rail
7 switch, you just shut them down.

8 Q All right. And I guess my question is: This is the
9 way it should be designed to be safe?

10 A This is the only way I know of designing to be safe.
11 Or the only alternates have three processors or four
12 processors or more. This is the simplest way to design it
13 to be safe.

14 Q Turn to the next one, please. You they the simplex
15 fault continue systems are not safe, and that makes my brain
16 hurt. But what do you mean by simplex fault containment
17 systems are not safe?

18 A Simplex is a term of art that people use to mean
19 there is only one as opposed to duplex. You have heard of a
20 duplex house, that means two. Simplex just means one. This
21 is another way of saying in more technical language if you
22 have one fault containment region where any fault inside can
23 do whatever it wants to make the system unsafe, then that is
24 not safe, you need two.

25 More specifically, let me tie this back to the

1 fault tree. When you have all the software in a system in
2 one fault containment region, and that fault tree has a
3 bunch of things going on, the and gates don't help you
4 because it is both happening in the same CPU, so there is no
5 way to say these are two independent things. The and gates
6 only work if they're independent. If they're not
7 independent, you're not safe anymore.

8 Q Is this the Toyota system?

9 A The Toyota system, we will get to some pictures, is a
10 simplex architecture with some built-in tests, it is not
11 duplex. And duplex is the minimum requirement to be safe.

12 Q What is the purpose of what you highlighted here?

13 A This is -- so NASA, in their report, referred to this
14 Hammett paper to define some terminology.

15 Q I see that is mentioned here and it is 2001. Is that
16 when that paper was published?

17 A That is my understanding.

18 Q You're telling us that NASA referred to the Hammett
19 paper?

20 A Yes. NASA explicitly referred to this and used
21 language out of it. So my impression is they referred to it
22 to make sure we understood what the words meant.

23 Q What do these words mean?

24 A The aerospace guys, I do some work with some
25 aerospace guys, and they all use these terms. They say

1 failure passive means that the thing shuts down and there is
2 an assumption that it is safe.

3 Fail active is a malfunction. So when you fail
4 active, it means it does the wrong thing and the presumption
5 is that it's dangerous. So if you say this system fails
6 active, what you are saying is it is unsafe. And the paper
7 spells it out. In some systems, it maybe okay if you lose
8 function an failsafe, but a malfunction can be catastrophic.
9 And that is my experience as well. So fail active is bad.

10 Q And your next page continue on, right?

11 A Right. These are some more pieces out of the paper.
12 And NASA references this, so I'm going to the pieces they
13 reference. So a simplex disengagement feature, in the NASA
14 report they said it was a simplex with disengagement. So
15 that means a single computer. And this exactly corresponds
16 to my understanding of the Toyota system.

17 So what you have is a computer with BIT. BIT is
18 built-in self test. And that maps to the failsafes. So you
19 have a computer, and it is computing along and something
20 goes wrong. You can put in a bunch of countermeasures to
21 say, well, let me check myself here, let me check myself
22 there, and let me check myself there. But no computer has
23 ever been made that has a single fault containment region,
24 can't check everything. There is always something that can
25 get by you.

1 I know when I write a paper and I proofread it, I
2 don't care how many times I proofread it, there is still a
3 typo in there somewhere. Nobody can check their own stuff.
4 It is the same thing with computers. This BIT helps some
5 because it catches a lot of the faults, but it can never
6 catch all of them. It is just not possible.

7 Q You talk about this BIT cannot check all faults.

8 A That's right.

9 Q Is the standard in the industry that you must check
10 all faults?

11 A The standard in the industry is all single point
12 failures have to be accounted for. That means all faults in
13 a single fault containment region.

14 Q Okay.

15 A And in the paper it says maybe it catches 19 out of
16 20, but one in 20 are left over. So that's why they have
17 this table. So this table sort of sums it up. If you have
18 simples with no built-in self test, well, that's easy, it
19 does whatever it wants to with the fault. With built-in
20 self-tests or failsafes in the Toyota system, this is their
21 system, it will turn itself off much of the time but not all
22 the time.

23 Q And this right here is the Toyota architecture?

24 A Figure 5 is how the Toyota architecture shows up in
25 this paper. Yes. I think that's a fair representation.

1 Q And here is what you referred to earlier. What is
2 that?

3 A That is a self-checking pair. And that is this
4 picture right here. So that's --

5 Q Okay.

6 A -- the two fault containment regions, they check each
7 other. This is all standard terminology. People have known
8 that for years, and this is a good paper that NASA referred
9 to to explain it. What it says is that simplex with
10 built-in self-test is after most failures it fails safe, but
11 after some failures it's going to failure unsafe.

12 Q NASA says this?

13 A This is what Hammett says, and NASA uses the Hammett
14 words to describe. The system refers to it quite
15 explicitly.

16 Q Hammett says this, and NASA refers to the Hammett
17 report.

18 A Here is the NASA language. It is a prime system, is
19 a simplex system. A wimples with disengagement monitor,
20 reference 14, and 14 and 14 is the Hammett paper.

21 Q So NASA -- this is NASA language?

22 A That is NASA language out of their report.

23 Q And they're saying that the system appears as a
24 simplex system with disengagement monitor and diverse
25 safing, correct?

1 A That's correct.

2 Q Is that the unsafe?

3 A That's unsafe.

4 Q Is it defective?

5 A It's defective.

6 Q The simplex system, go to the next slide. You
7 mention that the simplex system that Toyota uses -- and we
8 talked about A/D. Remind us what that is again.

9 A That is analog to digital conversion, voltages into
10 bits.

11 Q Tell us what you mean by this slide.

12 A By this slide, there is a single shared A/D
13 converter, but the fact of the matter is that both chips
14 together are the same fault containment region, there is no
15 good isolation. They are not a good self-checking pair.
16 They send data back and forth through a lot of failsafes,
17 but it is not perfect coverage. In particular, something
18 disturbing is the failsafes run on the same processors that
19 are doing the computation.

20 Q Why is that disturbing?

21 A Because you've got the same thing that is doing the
22 computations seeing if it made a mistake. Well, it if made
23 a mistake on a computation, why on earth would you believe
24 that it will get it right, the failsafe? Once it has made a
25 mistake, all bets are off.

1 Q Your next opinion here is that Toyota's methods to
2 ensure safety were themselves defective; is that correct?

3 A That's correct.

4 Q What do you mean by that?

5 A What I mean is that you need to use a rigorous
6 engineering process to be able to build safe systems, and
7 their engineering process was defective.

8 Q You mentioned in support of this idea of MISRA, set
9 by the MISRA automotive safety recipe. Again, that is the
10 big, thick document?

11 A That is the big book. Right.

12 Q Okay. What do you mean by this MISRA is a recipe?

13 A It's -- we're going to go through that in some detail
14 in slides, but it tells you what you need to do to be safe
15 at great length. There is a summary I can show you that
16 says, well, these are the kinds of things that you need to
17 do. It has everything that you need to know, all the
18 accepted practices for building safety.

19 And I want to point out that my wording is rather
20 precise here. I'm not saying that they had to follow MISRA
21 itself. They had to do something that was just as good.
22 MISRA is good. If they had done one of the other standards,
23 I might still be happy, but they didn't do anything that
24 meets this level. So they didn't go good enough, as opposed
25 to nitpicking them on individual practices.

1 Q Well, at the time, prior to the development of the
2 2005 Camry, were there even more rigorous standards than
3 MISRA?

4 A There were several standards that I would consider
5 more rigorous.

6 Q What do you mean by that?

7 A They required you to do more things. For a given
8 level of safety, you had to do more engineering, more steps,
9 more checks to meet that level.

10 Q So is it fair to say if they don't meet MISRA they
11 didn't meet even more rigorous standards?

12 A If they don't meet MISRA, they don't meet any of
13 them. I think that's fair. And in my opinion, I don't
14 think there is any of them they would meet.

15 Q And I know we will not go through the entire MISRA
16 document. Tell us what you emphasized here.

17 A This is a document. It has a main document that says
18 here is a methodical way to design safety critical systems.
19 Then there is nine reports. And the reports are specific to
20 things like for software integrity, and for how to do
21 hardware. There are different aspects so if you have a team
22 each part of the team might get one of the reports and
23 concentrate on that, and the main documents is overarching.

24 Q Mr. Ishii said in his testimony that Toyota had their
25 own code software standards?

1 A He was talking about the MISRA-C standard, which is
2 the small book.

3 Q Okay.

4 A And I don't recall him saying that they had a
5 standard like this that they were following. He was just
6 talking about the style.

7 Q And you make a good point. Based on Mr. Ishii's
8 testimony, where -- the big thick book -- he didn't even
9 mention any standards related -- any standards similar to
10 MISRA standards, did he?

11 A I did not catch any references to anything except the
12 C standard. I did not catch any reference to this standard.

13 Q And the difference between this MISRA, this big MISRA
14 report and this smaller one here, is what?

15 A The smaller one is very specifically ways to use the
16 C programming language in a way that is safe, and the bigger
17 one is how to design an automobile with software that is
18 safe.

19 Q So not only should they meet the standards -- am I
20 correct, not only should they meet the standards is the
21 large MISRA book,, but also the standards in the MISRA-C
22 book?

23 A Yes. In fact, we will see that on a chart in a
24 moment.

25 Q All right. Tell us what this is.

1 A This is a list of safety standards that follow a
2 thing called a SIL, safety integrity level, and this is sort
3 of the main concept in the safety standards. And I have
4 done at least some work with all of these at some time or
5 another. A big one at the time of MISRA is IEC 61508. And
6 I know that at least some car companies were looking at
7 using that standard as well as MISRA back then. The newer
8 standard, ISO 26262 was a new automotive standard.

9 MR. BIBB: Objection, your Honor.

10 THE COURT: Approach on this one.

11 (The following bench conference was had outside the
12 hearing of the jury:)

13 MR. BIBB: I thought there was a ruling about ISO
14 26262. That is the one that didn't come into effect until
15 November 2011.

16 THE COURT: I do remember discussing it in one of
17 the motions in limine.

18 MR. BIBB: I can get into standards that were in
19 existence at the time this car was manufactured. That is --

20 MR. PORTIS: I wasn't here for that one.

21 MR. BIBB: I think if we just move on we will be
22 fine.

23 THE COURT: Okay.

24 MR. PORTIS: If I get it in, I will have to lay a
25 predicate for it?

1 THE COURT: I think I already ruled. Right now I
2 ruled that it was a standard --

3 MR. PORTIS: Unless I lay a predicate for it. And
4 I may not be able to.

5 THE COURT: Right now, do not use that chart
6 anymore.

7 MR. BIBB: We can go to the next slide.

8 MR. PORTIS: Sure.

9 (Within hearing of the jury:)

10 Q (By Mr. Portis) We'll go onto the next slide. I may
11 come back.

12 A Okay.

13 Q Hold on a second.

14 (The following bench conference was had outside the
15 hearing of the jury:)

16 MR. PORTIS: Judge, what I'm going to ask him about
17 related to the ISO 26262 standard, was that information
18 available in draft form prior to the manufacture of our
19 vehicle.

20 THE COURT: Okay. Was there --

21 MR. CLARK: I think what the court's ruling was
22 last week was he didn't show what knowledge Toyota had about
23 it, not whether it was available or not, which Toyota had.
24 I'm not sure if I can make it a --

25 THE COURT: I think he can at least testify that it

1 was in a draft form at that point. Isn't that what they're
2 saying?

3 MR. PORTIS: Right.

4 THE COURT: Are you just basically going through
5 the different kinds of standards that were available during
6 2005.

7 MR. BIBB: This one was a draft.

8 MR. PORTIS: It is a draft of a standard, though,
9 that are more rigorous.

10 MR. BIBB: Just because there is a draft of a law
11 out there doesn't make it a law.

12 MR. BAKER: IEC 615108 existed in the '90s.

13 THE COURT: He already talked about that. He
14 didn't object to that.

15 MR. PORTIS: ISO 26262 is just an adaptation of
16 that standard.

17 THE COURT: But if it didn't exist in 2005 --

18 MR. BAKER: But there is going to be testimony that
19 they were aware of it. In fact, they were on the committee
20 for ISO 26262, Toyota was. They knew about the draft. I've
21 got the document to show it.

22 THE COURT: You have a document that Toyota knew
23 about that?

24 MR. BAKER: Yes, ma'am. It is a 2005 document that
25 shows this.

1 THE COURT: Does someone have my ruling about what
2 we talked about?

3 MR. CLARK: I think what you go on is line 18 are
4 where ever your comments start.

5 THE COURT: Okay. So yes. What I said is I need
6 to reserve whether I will allow it in until I see it Toyota
7 was, in fact, aware of the drafts.

8 MR. PORTIS: Yes.

9 THE COURT: So with this witness obviously it can't
10 happen because we don't know yet. Do you have a Toyota
11 witness that is already addressed this?

12 MR. BIBB: No.

13 THE COURT: Do you have something that you can show
14 me it is going to come into evidence?

15 MR. BAKER: We have some documents that we quoted
16 in our briefs. It is in Japanese. I'm not sure I have it
17 here. It is a 2005 document where Toyota is talking about
18 the ISO standard in 2005.

19 MR. CLARK: This is the one that I said I've never
20 seen in English.

21 MR. BAKER: I don't think this is a big enough deal
22 to stop.

23 MR. ESDALE: We will move on.

24 THE COURT: After all of that, just move on.

25 (Within hearing of the jury:)

1 Q (By Mr. Portis) Now, we were talking about
2 standards, and there were a list of --

3 A If I can summarize without mentioning that one
4 standard. The common aspect they all have is they have a
5 thing called a safety integrity level. You can decide how
6 critical something has to be, and then you pick practices.
7 All of those standards have that flavor, and they all have
8 sets of practices that are kind of similar, some are more
9 rigorous than others. 61508 was one at that time that was
10 more rigorous than MISRA. But if you followed MISRA, that
11 was accepted practice as well.

12 Q And you say that Toyota should have adopted MISRA?

13 A They should have adopted MISRA, or they should have
14 adopted something that is roughly comparable. So this is a
15 paper from 1997 where they are talking about be compliant
16 with a sector standard. If you're automotive, the obvious
17 choice is MISRA. But if you want to pick another standard
18 and make a case that it is more applicable to you, that's
19 okay too.

20 Q But Toyota says they picked their own standard, they
21 picked their own internal standard.

22 A To be precise, the standard they were talking about
23 was for code use languages. And I've not heard them talk
24 about a standard of -- a safety standard as such. That is a
25 much narrower statement, I believe.

1 Q I hadn't either, but let's assume that they did.
2 Let's assume that it wasn't related just to the code
3 language, but they had their own internal standard what is
4 the problem with having internal standards?

5 A If you have an internal standard, it's -- the onus is
6 upon them to demonstrate that it is as good as the public
7 standards, which have had scrutiny from people all over the
8 world and had buy-in that this is appropriate. The standards
9 I've seen are not like the MISRA software standards.
10 The only standards I've seen from Toyota are very, very
11 narrow coding standards.

12 Q All right. In this -- real briefly -- in this MISRA
13 safety integrity level, in the MISRA itself, if they wanted
14 to -- when did MISRA come into effect?

15 A That was '95.

16 Q '95. So in 1995, ten years before our car was
17 manufactured, if Toyota had wanted to build it safe
18 according to MISRA standards, were those available for them
19 to look at and to follow?

20 A Yes, they were.

21 Q Now, you mentioned earlier MISRA safety integrity
22 levels. And I see over here on the side integrity level 4,
23 3, 2, 1, 0. What is an integrity level?

24 A So an integrity level is the idea that depending on
25 how bad an outcome can be you need to pay more attention.

1 If you're making a product that at worst is a paper cut, you
2 don't have to spend the same engineering resources getting
3 it right as something that can kill somebody. And this is a
4 way to methodically say it starts with zero up to four. And
5 these same numbers appear more or less across all the
6 standards that's why I showed that slide.

7 It is a common idea that four is the highest level
8 of integrity. And that means this is something where, very
9 loosely speaking across all the standards. If it's cell
10 four, what that means is if there is a defect, if it is not
11 designed right or there is a runtime fault, that probably
12 you will have a large, large accident in which quite a
13 number of people die, that is an expectable outcome.

14 Three is more like, well, if this will misbehaves
15 for some reason, then it's pretty reasonable to expect one
16 or two or three or four or five people to die but not a
17 whole plane full of people. Down at two, you can expect
18 people to be severely injured, but you would be kind of
19 surprise if someone died, it would be a freak event. And
20 down at one, fender bender. So that is a lose way of
21 describing it. If you go to MISRA book, you will find
22 wording to this effect.

23 Q So the higher the integrity level the greater the
24 idea that it's safety critical?

25 A The higher the integrity level the more safety

1 critical it is; therefore, the more rigorous you have to be
2 to make sure you get it right.

3 Q And was this ETCS of Toyota, was it a safety critical
4 system?

5 A It was a safety critical system, and I would put it
6 at cell three.

7 Q On the next page, you mentioned Leveson. What is
8 that about?

9 A So this the original software safety research paper,
10 and she is defining safety critical systems are those that
11 can directly or indirectly cause or allow a hazardous system
12 state to exist. And safety critical software is software in
13 such systems. And the ETCS is clearly a safety critical
14 system.

15 Q And Toyota agrees, right?

16 A And Toyota agrees. Well, that deposition quote has
17 them saying yes to that question.

18 Q And Mr. Kawana is a Toyota employee?

19 A That is my understanding. Yes.

20 Q I want you to go to two more slides there. This is
21 what MISRA says is required for SIL-3 software development?

22 MR. BIBB: Objection. Leading.

23 THE COURT: Overruled.

24 Q (By Mr. Portis) Tell me about this document.

25 A This is a summary out of the big MISRA book which is

1 a summary of part of the recipe for getting it right. And
2 so if you have a cell three system, you have to do
3 everything inside the yellow. For cell three, everything in
4 this column and everything in the column two and everything
5 in the column one.

6 As an example of just one item, it says a
7 restricted subset of the standardized structured language,
8 the small MISRA document, MISRA-C, is the restricted subset
9 of the C programming language. So you have to follow that
10 document as cell two, which is only going to injure people
11 not kill people. And for cell three, you also have to
12 follow it. It is all these other things that you have to do
13 on top of that. That was the distinction that I was trying
14 to make.

15 Q Did Toyota follow -- is there another page?

16 A That is the top half, then there is the bottom half.
17 There is a bunch more things that you have to do.

18 Q We have testing, we have verification and validation,
19 access for assessment. And prior to that was specification
20 design, languages and compilers, configuration management
21 processes. Did Toyota follow one, two and three of all of
22 those standards?

23 A My opinion is they did not. For example, the
24 specifications are not formal. You recall Mr. Ishii was
25 asked about whether he had formal specifications. And the

1 answer, as I understood it, indicate a no. And the reason
2 is the word formal means mathematical. You actually have to
3 write the specifications out in mathematical notation to be
4 formally specified. And that wasn't his answer, and I have
5 certainly never seen such documents from Toyota.

6 The language, they did not follow MISRA-C.
7 Configuration management, this is making sure you can go
8 back and get whatever tools and whatever software you want
9 whenever you want it. And Mr. Ishii also said they didn't
10 use it.

11 For testing, the part of testing is coding rules,
12 and they did not meet the coding rules, and they did not
13 formally document deviations. So in the MISRA-C code it
14 says if you are not going to follow the rule, every time you
15 don't follow it, or for each class, you have to say why, and
16 it has to be in writing.

17 For validation, the reviews were informal and only
18 some modules. So you heard testimony they only looked at
19 some things, the things they were concerned about. World
20 safety critical software, you have to look at everything.

21 Q So just to put it in context, prior to the
22 manufacture of the -- even the vehicle involved in this
23 case, 2005 Toyota Camry, Toyota did not follow the
24 guidelines required of MISRA or SIL-3, correct?

25 A That is correct.

1 Q All right. Let's go to section 6.

2 A Okay.

3 Q You mention in your opinion three that Toyota safety
4 culture is defective?

5 A That is correct.

6 Q That's a -- why do you say that?

7 A Let me start by defining safety culture. Safety
8 culture is how the employees and the management treat the
9 concept of safety. Either safety is at the top of the list
10 always, or it's not. And we read about big catastrophes and
11 big problems like the space shuttle Challenger and things
12 like that, when you dig down far enough, what you find out
13 is the safety culture was broken. And because of that,
14 people took short cuts and people made mistakes, and there
15 was a big loss.

16 Q Tell us why it is important that there must be an
17 emphasis on safety that permeates an organization like
18 Toyota.

19 A If you put things above safety, then people are
20 incentivised (sic) to take shortcuts, they skip process
21 steps, they go through the motions instead of doing it for
22 real; that's how you end up with unsafe systems. Most of
23 the case studies come down to that people weren't taking
24 safety seriously and sure enough that led to an unsafe
25 system.

1 Even if they did try to follow a standard, if you
2 don't take it seriously, it's not going to do you any good.
3 If you define rules and you don't follow them, you're not
4 going to get safety.

5 Q Well, let's look at Toyota. Toyota, what they were
6 missing. Describe this particular document.

7 A So this is a document, it is from 2007, but my
8 understanding is it reflects processes that were in place
9 through 2007. They sat down and said, There is a processing
10 place for hardware but not for software.

11 And this is a classic V diagram, this is how most
12 automotive companies design software. They take a
13 high-level specification and they refine it to details to
14 write code. And going up the other side, they are making
15 sure that each step got done right.

16 Q What is your concern with it?

17 A My concern is it's marked. And these are their
18 markings. The only thing that I put in here it was this
19 yellow highlighting.

20 Q The only thing you have done to this document is
21 add --

22 A That yellow highlighting. These boxes were all
23 there. And they have an X saying no knowledge at Toyota for
24 all of these boxes. And these are the kind of module
25 inspections, software binding inspection. So these are all

1 the things to make sure that your engineering process was
2 executed correctly. And this document says no knowledge at
3 Toyota, so I find that very concerning.

4 Q why is that concerning to you as a computer software
5 engineer?

6 A When you are doing software safety, it is important
7 to do checks and balances. No one person should be able to
8 make a mistake without it being found later, because people
9 make mistakes, right? That's what they do, so you have to
10 have checks and balances all the way up. It says here
11 Toyota didn't have knowledge in those areas, so they were
12 getting software and they were getting an operating system
13 with no assurance that it was useful for safety, and they
14 were not checking it themselves, and they didn't have the
15 capability to check it themselves.

16 The same thing, the Denso code, they didn't have
17 the capability to check it for themselves, and they didn't
18 have an independent certification saying that somebody
19 outside had checked it for them.

20 Q You mentioned a name right now that had not been
21 mentioned before, and that is Denso. What is their
22 involvement with Toyota?

23 A Denso is the company that actually did the low-level
24 design as a supplier to Toyota.

25 Q And is that common in the industry?

1 A That's common in the industry.

2 Q What is Toyota's responsibility related to the Denso
3 work?

4 A In a standard, in a MISRA type setting or a safety
5 critical type setting, their responsibility is to ensure
6 each component they get is safe. And there are several ways
7 you can do this. You can check it for safety yourself,
8 although this chart suggests they didn't have that
9 capability; you can have the supplier document and convince
10 you that they did it, but o do that they not only produce
11 the code, but all the audit trails and all the reports, we
12 did a peer review, we did all our things, here is our
13 paperwork to prove to you we actually followed the process
14 we're supposed to follow; or as was common in 2002, I was
15 involved in one of these, you would have an independent
16 company come in and do the audit for you and you would
17 believe their report.

18 Q Let's talk about the ETCS and whether or not Toyota
19 took the electronic throttle control system seriously.

20 A Couple of the documents I've seen, the first one was
21 a letter to a customer which said for the accident to occur
22 -- and this is a customer complaining of the UA event -- as
23 reported, two totally separate systems, brakes and throttle,
24 would have to fail at exactly the same time, and this is
25 virtually impossible. The brakes will always override the

1 throttle.

2 And my understanding is to do vacuum depletion that
3 is not always true, although other experts will testify in
4 more depth about that.

5 Q what else did you have?

6 A The other one, this is a deposition of a Toyota
7 employee whose job it is to take car that have had reported
8 problems and see what happened, see if the car is defective,
9 something wrong with it. And he was asked -- and there are
10 several pages, but this is the heart of the matter -- again,
11 as an engineer, do you recognize the possibility when you
12 investigated these 10 to 50 reported events of unintended
13 acceleration, did you acknowledge the possibility that these
14 reported events of unintended acceleration could have been
15 caused by a problem with the software in the vehicle? She
16 is asking could it have been software that caused UA.

17 And their technician, who specializes in figuring
18 out what happened said, No, this is not something I
19 recognized. In the Toyota system, we have the failsafe, so
20 a software abnormality would not be involved with any kind
21 of UA claim.

22 Q well, in the Toyota system do they have the failsafe
23 to stop unintended acceleration?

24 A They have some, but they don't have enough to catch
25 them all. But beyond that, in a mature safety culture, you

1 don't say, well, we think we got it all so that is
2 impossible. You say, in these cases, he could find nothing
3 wrong with the car. And if you find nothing wrong, and
4 you're ignoring software, that is a big problem from a
5 cultural point of view. You have to take software faults
6 seriously, even if you think you're perfect because nobody
7 is perfect.

8 Q All right. Go to section 7. We heard from Mr. Ishii
9 this Denso had done some software programing and it came in
10 and they did some testing. Did you hear that testimony?

11 A I recall that yes.

12 Q Is testing, testing of that software, is that good?

13 A Doing some testing is good, but it is not even close
14 to good enough to make sure a system is safe.

15 Q Why is that?

16 A You can never test long enough and thoroughly enough
17 to find all the little bugs. What happens is when you test
18 you shake out some of the bugs that happen all the time, but
19 you don't catch the ones that happen very infrequently. And
20 system testing, you just can't -- nobody can buy enough
21 vehicles and test them for long enough to catch all the rare
22 bugs, just can't do it.

23 Q Now, in your next slide there, you talk about
24 validation testing; is that right?

25 A That is correct.

1 Q And this all goes to your opinion that Toyota should
2 have gone beyond just vehicle level testing, right?

3 A That's correct.

4 Q And you described why they should go beyond vehicle
5 level testing, right?

6 A That's correct. There is more to it than that. You
7 can't test long enough to see everything, but there is also
8 somethings that you can't do at a vehicle level. For
9 example, fault response. What if this bit flips? Well,
10 there is no way testing a vehicle, unless you modify it, to
11 flip the bit. So you don't know what is going to happen.

12 Q So if you cannot do enough vehicle testing, what do
13 you do?

14 A You do other things. You do fault injection, which I
15 will talk about in a second, and you also have to make sure
16 you have a rigorous engineering approach. Testing just
17 isn't enough. You have to have a good engineering process
18 on top of it.

19 Q Because it is impractical to test everything at the
20 vehicle level?

21 A You just can't test everything.

22 Q Now, as part of your work, is it true that NASA
23 described Toyota testing?

24 A So NASA did describe some Toyota testing. This is a
25 point that -- I think it is on the next slide -- this is

1 point even if you have 500 cars for 2,000 hours, you're
2 going to see a thousand times more rare things in the --

3 Q Say that again.

4 A Even if you had 500 cars for 2,000 hours, which is a
5 million hours, this is about how much Toyota tested I
6 believe, that is going to see things that happen once every
7 million hours. But if you have 15 years, the fleet will see
8 maybe a thousand times less likely things.

9 Q Look at the next slide.

10 A So they did 35 million miles of system level testing;
11 that is actually generous based on the NASA data. I gave
12 them credit for all of their vehicle testing, so I rounded
13 up

14 Q So you looked at all the testing that was done by
15 NASA?

16 A This is NASA reporting what Toyota did. NASA did
17 very little testing, they had limited resources. So this is
18 Toyota spent a lot of time driving vehicles around, which is
19 a good thing. But if they had 400,000 Camrys year -- and
20 the numbers go up and down, but that's in the ballpark --
21 and all those vehicles get driven one hour per day, that is
22 145 million hours of exposure just for one year worth of
23 Camrys.

24 Severe testing for 12 million hours, you will see
25 things that happen every 12 million hours. You will not see

1 things that happen every 20 million hours, but your fleet is
2 going to see it.

3 Q According to the NASA report, what did they
4 determine?

5 A And they said, No reasonable -- Toyota's vehicles are
6 so complex that no reasonable amount of analysis or testing
7 can prove an absence of errors. This goes back to you just
8 have to assume any single pointed failure is going to have a
9 problem. There is no way you're going to prove it doesn't
10 through analysis and testing, you just assume it is there.

11 Q Is that why the rigorous engineering process is
12 absolutely vital?

13 A It's absolutely vital because no amount of testing
14 demonstrates it is safe. You have to do something else.
15 And the something else is good rigorous engineering.

16 Q Is it true there are just going to be some bugs, some
17 faults that cannot be found?

18 A There is always going to be software bug that you
19 can't find. There is always going to be hardware events,
20 maybe hardware bugs that you can't find. You do rigorous
21 engineering to make sure you have gotten as many of them as
22 you can to a sufficient level, and then you add failsafes on
23 top.

24 Failsafes are great for the couple that you didn't
25 know about, but if you skip the step of being rigorous and

1 then you say, well, the failsafes will catch us, that is not
2 good enough.

3 Q In this vehicle, Toyota has argued, Listen, we have
4 gone with the car, looked at the system, we can't reproduce
5 any of these things going on. Are bugs reproducible?

6 A So let's see. Some faults are harder to find.

7 Q Right.

8 A And some faults are impractical to reproduce.

9 Q Why is that?

10 A In a system -- so some of the fault injection that I
11 showed you before where they said, All right, we flipped
12 some bits and we produced UA, they had to specially modify
13 the system to be able to flip those bits. There is no way
14 to go into a Toyota system and say, I am going to flip that
15 bit here without modifying it. You just can't do it.

16 And even if you could, there maybe very, very tight
17 timing that if the bit flip happens exactly in this time
18 window, it goes nuts, and everything else, no big deal.
19 There is just so many things to try that it may be very hard
20 to find it. Even if you find it, what people have found is
21 it is just this thing that comes and goes. And there is no
22 way. You can try a hundred times, a thousand times, maybe
23 you get lucky, maybe you don't.

24 I have friends in the compressor business that will
25 take a compressor that fails regularly, bring it back, and

1 they will run it three weeks, four weeks, five weeks, and
2 they don't see anything. If they're luckily after six weeks
3 they see it, or maybe they don't. That's just the way it
4 is. You crash a laptop computer, somebody says, Make it do
5 it again. You can't do that. Sometimes you can, but a lot
6 of times you can't.

7 Q Now, your next opinion is that Toyota's source code
8 is of poor quality. And we mentioned source code earlier.
9 If you can just refresh our memory on what source code is.

10 A Source code is the human readable recipe, a computer
11 program. So it is in the C programing language for the main
12 CPU. It is in a thing called the assembly language for the
13 ESP-B2.

14 Q Have you reviewed Toyota source code?

15 A I have not reviewed Toyota source code.

16 Q why not?

17 A I was asked for access, and it was denied several
18 times.

19 Q The --

20 MR. BIBB: Your Honor, can we approach on that.

21 THE COURT: Yes.

22 (The following bench conference was had outside the
23 hearing of the jury:)

24 MR. BIBB: I think that leaves a false light with
25 this jury. He was denied access not by Toyota but by Judge

1 Selna. He has limited the number of people, he limited it
2 to 12 experts.

3 THE COURT: Why didn't someone come to me and ask
4 me to give him access like you did with the lawyers?

5 MR. PORTIS: That is -- his report had already been
6 done. That is untrue. Toyota has specifically said we
7 don't -- we're not going to allow him to have access, and
8 they told Judge Selna that.

9 MR. BIBB: We have opposed expanding the number of
10 experts in there, and Judge Selna has agreed. We expanded
11 the number of attorneys who have access to source code
12 information on a case-by-case basis as needed.

13 MR. CLARK: There are 12 plaintiffs' experts that
14 have source code access. They either have three or four of
15 them in this case. So they had eight or nine other options
16 that they could have hired, so it's really misleading the
17 way it is right now to the jury.

18 MR. PORTIS: Well, I don't know about misleading.
19 All I'm asking him -- I asked him why -- because he gives
20 the opinion it is of poor quality. And I will establish the
21 foundation as to why he says that. I think the jury is
22 entitled to know that he was denied access to the source
23 code, period. I think they're entitled to know that. It
24 has been requested that he have access to source code.

25 THE COURT: And Judge Selna didn't allow -- and

1 Toyota objected, and Judge Selna didn't allow it, right?

2 MR. PORTIS: Correct.

3 THE COURT: Do you want me to tell the jury that,
4 that he requested it in another litigation?

5 MR. BIBB: I think so.

6 MR. BAKER: As long as you say Toyota objected to
7 it.

8 THE COURT: I say that, obviously they have heard
9 about the multi-district litigation anyway. Do you want me
10 to instruct the jury that he requested through the
11 multi-district litigation, explain to them that the source
12 code is confidential, that he requested it through the
13 multi-district litigation, Toyota opposed it, and the judge
14 in that did not allow him access?

15 MR. BIBB: I think also what he said, that the
16 court allowed 12 plaintiffs' experts -- 12 experts.

17 MR. PORTIS: Not in this case. Not in this case.

18 MR. BIBB: The total of 12 experts to have access
19 to the code and denied his access. You have three in this
20 case.

21 MR. PORTIS: That's too far, your Honor.

22 MR. BIBB: They examined him about it.

23 (Within hearing of the jury:)

24 THE COURT: Ladies and gentlemen, Toyota -- what we
25 referred to as a source code, is highly confidential. And

1 in the multi-district litigation, Dr. Koopman, the request
2 was made for him to see the source code. Judge -- Toyota
3 objected to expanding the parties who -- or the people who
4 could see the source code, and Judge Selna did not allow
5 additional parties to see the source code. So that's -- to
6 explain his comment about not being allowed to see the
7 source code.

8 Q (By Mr. Portis) The fact that you have not see the
9 source code and you this opinion this the Toyota source code
10 is of poor quality, how do you square that? Let me ask it
11 again. How do you square that?

12 A The way I look at it is I've done many design reviews
13 where I don't see the source code. In fact, most of my
14 safety reviews the source code hasn't even been written yet.
15 And they ask me higher-level things like, Can you find a
16 single point of failure that we can fix.

17 The ones where I do have source code I've noticed a
18 correlation and the academic literature supports a
19 correlation between some high-level qualities of the source
20 code and whether it is defective or not.

21 So my opinions are based on the summaries done by
22 NASA, done by Mr. Barr and his team that say, Here is some
23 descriptions of things that the source code does that are
24 commonly accepted as defective practices and not accepted
25 practices. So I'm opining based on those summaries that I

1 say, Gee, for example, it has 10,000 global variables.

2 well, I know that the right answer academically is
3 zero. And in practice, five, ten, okay, fine. 10,000, no,
4 we're done. It is not safe, and I don't need to see all
5 10,000 global variables to know that that is a problem.

6 Q what is a global variable?

7 A So a global variable is -- let's go back. So a
8 variable is a location in memory that has a number in it.
9 And a global variable means any piece of software anywhere
10 in the system can get to that number and read it or write
11 it. That is considered a bad practice because it is hard to
12 tell what is going on.

13 when you have hundreds of thousands of lines of
14 software, it is really hard to tell who changed it and when
15 they changed it, and it is well known to be very bug prone.
16 And that has been known since the 1970s that that's a really
17 bad idea.

18 Q Was the Toyota -- was the Toyota programming, was it
19 prone to bugs the way it was designed?

20 A From everything that I've from the software quality
21 metrics, I would call that software prone to bugs.

22 Q Tell me your support that -- tell me about your
23 support that the Toyota source code is of poor quality.

24 A To start with, there is the MISRA-C guidelines. This
25 is the small book that we have been talking about. And it

1 tell us you how to use the language. Here is an example:
2 Toyota actually does not make a mistake on rule 35, but it
3 is easiest one to explain.

4 So if you say A, equal, equal B, or A, equal B,
5 they look almost the same. I've made this mistake. It is
6 hard for me to believe that any programmer has never made
7 this mistake. It is easy to miss. But this one says if
8 they're the same do this, and that's okay. This one says
9 take B and put the value in A so it corrupts the value of A,
10 with the value of B, and it is probably not what you meant.

11 The compiler will say, Sure, I know how to do that,
12 but it is dangerous. So MISRA-C says even though this is a
13 valid line of source code, you're not allowed to do it
14 because it is too dangerous. There is 127 rules in the 1998
15 version that are all I know you can you do this, but it is
16 not allowed, it is too dangerous. It is pointing a loaded
17 gun at your foot. I know you're not going to pull the
18 trigger, but don't do it.

19 Q Tell me about that.

20 A So MISRA-C, or something like it, some restricted
21 sub-setted language, is required a MISRA cell 2 or higher.
22 And they also say, you know some of these rules are just
23 advisory instead of required. Most are required. Some are
24 just good ideas. But any time you violate a rule all
25 deviations should be documented. So you either have to have

1 written down someplace that someone can see one of the MISRA
2 SIL-3 things was everything has to be written down to see
3 it. If it is not written down, it is not MISRA SIL-3.

4 So you have to have it written down, or a rule 35,
5 we decided we're not going to do it and here is why. Rule
6 127, we decided not to do it in this one place, and there is
7 a line in the source code saying in this one place we
8 decided it is okay. But if it is not written down, it did
9 not happen.

10 Q Again, the MISRA-C is that a recipe to write the
11 language properly?

12 A That is a recipe to use the language properly that is
13 widely used outside of automotive.

14 Q Even based on listening to Mr. Ishii did they follow
15 MISRA-C?

16 A They did not follow it. He said that they followed
17 about 50 percent.

18 Q Right.

19 A Okay. And what we found was you can -- to know
20 whether you followed it, you can actually use a piece of
21 software that goes through and says, Hey, did you follow it
22 or not? NASA checked 35 of the rules and found 7,134 places
23 where they didn't follow the rules. Mr. Barr checked the
24 2004 version of the rules which have a few more rules than
25 the 1998 version, but not really that different, and found

1 81,514 violations.

2 Q Are you telling the ladies and gentlemen of the jury
3 that Toyota had this many violations of MISRA-C?

4 A Yes, I am. That's my understanding based on the
5 analysis done by these sources.

6 Q All right. Now --

7 A And I should say the accepted practice is zero.

8 Q Zero?

9 A Zero. You should have no violations. If you have a
10 violation, the way around it is you put in the source code,
11 Hey, I'm going to violate rule 127 on the next line. Here
12 is why it is okay, and then the warning turns itself off.
13 So you can get to zero as long as you have documented why
14 particular ones are okay.

15 Q Why else do you say that this source code is of poor
16 quality?

17 A I looked at some of the warnings. Mr. Barr provided
18 a very detailed analysis rule by rule, not with the lines of
19 source code but with the kinds of mistakes they're making.
20 And so number 52 unused variables. So that's a place where
21 you said, I'm going to store something in this location and
22 you never use it. Okay. Declared, but not referenced. I'm
23 going to have a subroutine, and I have a subroutine called
24 add three things. And you say I will define it, and you
25 never get around to it.

1 Uninitialized variables. Here is something where
2 you say, here is a value I will use later, and you forget to
3 set it to a value, so who knows what the value is. Those
4 are all just sloppy coding practice. Those are the kind of
5 things if teaching you programming and you make those
6 mistakes I slap your hands because nobody should ever make
7 those mistakes.

8 Q And you actually write code, don't you?

9 A I've written plenty of code. And if I weren't a
10 compiler, and it tells me any one of those things, I fix it
11 every time because that is a malfunction waiting to happen.

12 Q Earlier, in Mr. Ishii's testimony, there was a graph
13 that is part of a -- there was a graph. This graph right
14 here. Mr. Kawana had given a presentation. Also, Exhibit
15 4229, which is a paper written by Mr. Kawana called the
16 *Empirical Approach for Reliability Assurance of Vehicle*
17 *Software* by Toyota Motor Corporation.

18 A Yes.

19 Q He introduces this particular graph?

20 A Yes.

21 Q Can you tell us about that.

22 A The meaning of this graph is based on his studies at
23 Toyota was that these rule violations that they -- they
24 81,514 things that I told you about, the MISRA-C, and my
25 understanding is that's the criteria that he used too. That

1 for every 30 rule violations, you can expect on average
2 three minor bugs and one major bug. If you take 81,514
3 warnings divided by 30, if I punch the numbers into the
4 calculator correctly, that predicts 2,717 major bugs based
5 on the data from this paper. Now, I will not say that is an
6 exact count, but it is not ten.

7 I also scoured the academic literature. The
8 practitioners all sort of know this intuitively, but I was
9 able to find empirical study that found a statistical
10 correlation between these warnings and code quality.

11 Q So just so I understand this, Toyota and Mr. Kawana
12 had this idea that if you had 30 rule violations -- and in
13 this case we had -- we're found 81,514 violations, correct?

14 A Yes.

15 Q Then you would divide that by 30 to determine how
16 many major bugs you would have in the particular software?

17 A That's how I interpret the paper.

18 Q And that is the software in this case, right?

19 A That is correct.

20 Q Now also in that paper, if you go back to the slide
21 that starts with Toyota didn't follow most of MISRA-C rules.

22 A Yes.

23 Q Discuss this right here.

24 A This is out of a slide set, but it goes with a paper,
25 that my interpretation, when I look at this, is I look and

1 it and said -- what these slides say to me is that Toyota
2 required 114 rules and advisory 35 rules. This conveys to
3 me that whoever presented this is representing that Toyota
4 followed all the rules.

5 Q Is that correct?

6 A It's incorrect for two ways. One is Mr. Ishii said
7 they only followed about 50 percent of the rules. But what
8 I found was that they followed -- Mr. Barr -- excuse me --
9 what Mr. Barr said was they found -- followed maybe 11
10 percent, much smaller number.

11 Q If you will, we talked about global variables. I
12 want us to talk a little bit about cyclomatic complexity.

13 A Okay.

14 Q Cyclomatic complexity.

15 A McCabe Cyclomatic Complexity Metric.

16 Q Then -- and we heard this used in opening. We heard
17 about this idea of a spaghetti metric. What is this all
18 about?

19 A Well, spaghetti is -- spaghetti code is a term that
20 is widely used. It is not a very -- it's not a compliment
21 when you call someone's code spaghetti code. You can think
22 of a plate of spaghetti. If you have a big pile and plate
23 of spaghetti and you pull on one end of a piece of
24 spaghetti, not only does it look tangled, that's part of it,
25 you pull on one end, you have no idea which other end is

1 going to start moving.

2 So the fact that it is tangled has to do with,
3 well, there is some picture. This is out of National
4 Institute of Standards and Technology Report of cyclomatic
5 complexity. Some functions, what you do is you kind of
6 count up the number of ways through the code. This is very
7 loose.

8 MR. BIBB: Your Honor, can we approach for just a
9 moment.

10 THE COURT: Yes.

11 (The following bench conference was had outside the
12 hearing of the jury:)

13 MR. BIBB: Again, as I recall they needed to lay a
14 foundation before they can talk about that spaghetti code.
15 I was a little slow on the draw there, and I apologize. But
16 they need to lay a foundation for that. I think that was
17 the court's ruling before they can introduce spaghetti code.

18 THE COURT: I thought I allowed spaghetti code.

19 MR. BAKER: You did allow spaghetti code.

20 THE COURT: Toyota had used it.

21 MR. BAKER: Toyota had used it, and because it is a
22 term of art within the industry. He just said it was a term
23 of art.

24 THE COURT: Do you have my ruling on that?

25 MR. PORTIS: We can't lay a spaghetti code

1 foundation? Are you saying that I can't lay a foundation in
2 the spaghetti code.

3 MR. BIBB: Again, it is the source code.

4 THE COURT: Okay. So sorry. Now, what was just on
5 the screen what did that it say again?

6 MR. PORTIS: It was talking about --

7 THE COURT: Just explaining spaghetti code in
8 general?

9 MR. PORTIS: Yes, ma'am.

10 MR. BIBB: There has been no foundation laid that
11 the code in this engine in this vehicle is spaghetti code.

12 THE COURT: I thought Toyota calls it spaghetti
13 code.

14 MR. BIBB: No. No. Toyota talks about the
15 spaghetti code generally. That was the whole part of the
16 argument last week was that general discussions of spaghetti
17 code don't get us to the coding of this vehicle being or not
18 being spaghetti code.

19 MR. PORTIS: That's how we will get into the
20 foundation of it.

21 THE COURT: Is he going to make an analogy and say
22 this code was spaghetti code?

23 MR. PORTIS: Yes, ma'am.

24 THE COURT: What is he going to base it on since he
25 hasn't seen the code?

1 MR. PORTIS: He will base it upon the material that
2 is in the NASA report. I will ask him what he will base it
3 on, but the material he reviewed.

4 THE COURT: But that he somehow will testify that
5 he has seen enough of that to say that it is spaghetti code?

6 MR. PORTIS: Well, I don't know that he needs to
7 see the code. He can rely upon other academic information
8 to provide his opinion about it.

9 MR. CLARK: There is no foundation at this point.

10 MR. BAKER: Why don't we give the jury a break so
11 we can talk about this.

12 THE COURT: Let me ask: All he talked about right
13 now is the concept of spaghetti code in general?

14 MR. PORTIS: Yes, ma'am.

15 THE COURT: He hasn't mentioned anything about
16 Toyota?

17 MR. PORTIS: Yes, ma'am.

18 THE COURT: Do not mention anything about Toyota
19 until there has been a foundation laid that he knows enough
20 about it. He can reference where it is or is not. He can
21 continue to talk about just generically what spaghetti code
22 is.

23 MR. PORTIS: Yes, ma'am.

24 MR. BAKER: I guess the concern I have right now
25 with your ruling is I understand he doesn't know if it --

1 the witness -- and he may have to go into an answer. That's
2 why I think we should take a break.

3 (Within hearing of the jury:)

4 THE COURT: We will take our afternoon break at
5 this point in time. We're in recess for 15 minutes or until
6 2:45.

7 (Whereupon, the jurors exit the courtroom.)

8 THE COURT: So the whole reference about the
9 spaghetti code, what he is talking about right now is just
10 generally what spaghetti code is.

11 MR. PORTIS: It is a couple of things. And I will
12 show you this slide, which was the next slide. One
13 spaghetti code we're going generally into it and talking
14 about what spaghetti code is, trying to define it, so the
15 jury would understand it. Then his support of he is coming
16 in saying, Look, I think this is spaghetti code based upon
17 what I've observed. This is what I've observed.

18 THE COURT: Have you seen this one?

19 MR. PORTIS: Yes, they have seen that.

20 THE COURT: Mr. Bibb it is page 73.

21 MR. PORTIS: This is what I observed. I have seen
22 there is 10,000 global variables in this. This is spaghetti
23 code. I talked about the global variables. I know in the
24 industry, based upon the fact that this has 10,000 globe
25 variables, that that means this is spaghetti code in and of

1 itself.

2 MR. BIBB: Is that really proper testimony from Mr.
3 Barr to talk about? He is the one that looked at the code.

4 MR. PORTIS: Barr can talk about it too.

5 MR. BIBB: I need to object more on hearsay of him
6 saying that is what Mr. Barr told me. I think that goes
7 beyond an expert relying on materials in the field, he is
8 relying on another witness.

9 MR. TEAGUE: He just can't parrot another expert.

10 MR. PORTIS: He can rely upon academic information,
11 period. But all that said, I do think the objectionable
12 part to this particular is the -- in the bottom right which
13 is a Toyota document.

14 MR. BAKER: We have taken that out.

15 MR. PORTIS: We will take that out. So we're not
16 discussing that. But in terms of just the general
17 information and the information that he knows about
18 spaghetti code and the term of art, this is what he will
19 testify and the foundation for that.

20 MR. CLARK: I think we probably need some more, for
21 sure, at a minimum we need some more testimonial foundation
22 before that slide goes up on the screen, and some
23 testimonial foundation specific to what he knows from his
24 work as opposed to Mr. Barr's work.

25 THE COURT: He can rely upon other expert's work,

1 and he can rely on hearsay. So I will allow him to testify
2 as to this, but I do want the reference to the Toyota
3 document --

4 MR. BAKER: It's already out.

5 MR. CLARK: Just for the record, we're objecting to
6 the relevance and the 403 that we made last week.

7 THE COURT: All objections are reserved. Yes.

8 (Whereupon, a short recess was had.)

9 THE COURT: We're back on the record. Members of
10 the jury are present as well as counsel and their clients.
11 Dr. Koopman is still on the stand. You can continue your
12 direct examination, Mr. Portis.

13 MR. PORTIS: Thank you, your Honor.

14 Q (By Mr. Portis) We were talking before we broke
15 about this cyclomatic complexity spaghetti metric and trying
16 to get educated exactly what it is. A spaghetti code, and
17 you described it is generally compared to a bowl of
18 spaghetti and picking out one end or another. Is that a
19 term of art used in your particular field?

20 A Yes. It is a term of art. In my expert report, I
21 reference several academic references that actually use that
22 term.

23 Q When you say that code with structural problems is
24 often called spaghetti code, tell me what you mean by that.

25 A So what I have done is I've taken the usual

1 definition and sort of summarized them into a generic one.
2 It is incomprehensible code, meaning a person is probably
3 not going to understand it. If you can't understand it,
4 that means there is probably bugs because you don't
5 understand it.

6 Incomprehensible code due to unnecessary coupling,
7 jumps, gotos, or high complexity. In this case, the
8 coupling refers to those globe variables that we were
9 talking about that take two pieces of software and make them
10 interact. And the complexity is the cyclomatic complexity
11 metric. And jumps and gotos are other things that just
12 cause the program to jump all over the place while it is
13 executing.

14 Q So under where you have got this highlighted, very
15 high cyclomatic numbers, would that include global
16 variables?

17 A Those are just talking about control flow, so this
18 is --

19 Q Describe that.

20 A So control flow is the path through the program. If
21 this, do this, or else do this other thing. So this metric
22 does not include global variables. There are two ways to
23 look at it, and this one is just about the path of if this,
24 do this.

25 Q Okay. And on the next page, you say that the Toyota

1 electronic throttle control system has untestable spaghetti
2 code; is that right?

3 A That's correct.

4 Q why do you say that?

5 A I say it because from this NASA report, and in
6 general practice, it is considered if you a number of more
7 than 50, there is lots of ways through this code. As a
8 practical matter, you can't test it, there are too many
9 possibilities. No way to exercise them all. So a number of
10 15, 20, not so bad, 15 or 20 are not so bad. Fifty is
11 untestable, more than, say, 75, it's so bad that every time
12 you make a change you're probably going to create a bug.
13 And this comes from the Reliability Analysis Center, which
14 is an Air Force run place that deals with reliability of
15 everything. And that -- they're just summarizing what
16 people in the industry tend to think.

17 Q Now, the code that Toyota wrote for the 2005 Toyota
18 Camry, was it code that was written from the ground up, per
19 say?

20 A My understanding is they built on previous code.
21 when you do that, that is one way to get spaghetti code is
22 by building on previous code. Instead of going back and
23 cleaning it up, you saw those uninitialized variables,
24 basically poor housekeeping. Instead of keeping the house
25 clean, they built more stuff on top of it. That is my

1 interpretation of those metrics.

2 Q what about the target throttle angle complexity is
3 high? what does that mean?

4 A Well, in general there are 300 functions greater than
5 20. There are 12 functions greater than 100, which is just
6 a staggering number. That is a complexity of more than a
7 hundred. Anything over 50 is considered untestable, and Mr.
8 Barr found 68 functions greater than 50.

9 A target throttle angle computation, which tells
10 you how open the throttle should be, had a complexity of 146
11 and 20 pages of source code. This is far too complex, far
12 too long to be considered good code. So it's hard for me to
13 imagine how it could be tested thoroughly, how anyone could
14 really understand it completely.

15 Q When you say that it is untestable, are you talking
16 about -- when is that testing occurring?

17 A During design. What you do is you take each
18 individual software function and test it very thoroughly
19 before you ever put it in a vehicle. A cyclomatic
20 complexity of 146 as a practical matter it is really hard.
21 We have seen no evidence. In a SIL-3 system, you would say,
22 Here are all the tests that we ran, and here is how we know
23 they are good. We haven't seen that.

24 It is hard to imagine how to test a function like
25 this. It would take a Herculean effort to do it if you can

1 do it at all.

2 Q Then you mentioned that the spaghetti code has a
3 tangled or complex structure; what is that?

4 A That is back to the plate of spaghetti. So there are
5 two types of things that you worry about. One is the
6 control flow if this, else this, if this, and that is what
7 the number is. With 67 functions above 50, just based on
8 that number I can conclude that the ETCS code is control
9 flow spaghetti. So control flow is the "if else."

10 But I can also conclude that with all those 10,000
11 more or less global variables, it is data flow spaghetti.
12 In other words, the data, the global variables are pointed
13 out from everywhere, and there is no reason for it to be
14 that way. On both counts, I look at this code and say, I
15 can't imagine how someone can get this safe. It is too
16 complicated to test, it is too complicated to understand.

17 Q Now, your next section here, your next few sections
18 really follow under this idea that Toyota did not follow
19 other accepted practices. Are you referring to MISRA and
20 other practices here?

21 A Back when I did the two tables with MISRA with the
22 yellow circles, those were sort of engineering methodology.
23 But you also have to get the technical stuff right. Just
24 because you follow good process, if you are clueless about
25 how the technology works, you will not get it right either.

1 These are about how the technology works.

2 Q I see. So we discuss MISRA, now we're talking about
3 technology. Can you describe specific difference between
4 that.

5 A So the most of the MISRA were -- steps were -- this
6 is software guidelines -- how do you know that you got it
7 right? What did you do to convince yourself you got it
8 right? These are basic things that we feature to undergrads
9 saying when you are writing code, you have to do it this way
10 or it is going to be wrong.

11 Q We know on the software part, we know they didn't get
12 it right. I think there were 81,000 plus defects.

13 A That was one aspect. We will talk about things
14 beyond that, so even beyond that.

15 Q And by the way, were those 81,000 plus defects, were
16 those ever documented by Toyota?

17 A Not that I know of. I'm sure that there were some
18 defects that they were aware of, but my understanding is
19 that the number they knew about was much, much smaller.

20 Q Now let's go through these quickly.

21 A Okay. I will just explain the high level idea. And
22 Mr. Barr will go into details about these later, so this is
23 a preview. There is a thing called a stack where the
24 program keeps its temporary working variables. I think if
25 you have a notebook and you have the top page is what I'm

1 going to do today, then you go to the next page, eventually
2 you run out of pages in the book. If the last two pages
3 that you had set aside for things that can't ever be
4 overwritten, and if you run out of pages and you don't pay
5 attention, you might start writing on top of them.

6 So that is a stack overflow. If the stack grows
7 too big, it will actually corrupt the globals that we were
8 talking about, or operating system, and cause the system to
9 malfunction. This is a well-known problem. If you're not
10 paying attention, it happens to embedded systems. I have
11 done design reviews where they had this problem.

12 Q Was that an issue with Toyota?

13 A My understanding is that Toyota used far more of the
14 stack than they thought they used, and Mr. Barr will have
15 specific opinions about that.

16 Q Fair enough.

17 A Part of getting the stack right is you're not allowed
18 to use a thing called recursion. Recursion is when a
19 program calls itself and says, I want to add a number, how
20 do I do that? I want to add two other numbers. How do I do
21 that? I will add two other numbers.

22 Every time it calls itself, it is like sending
23 yourself a message, and the message says, Send yourself
24 another message. And you are not allowed to reply until you
25 are done sending yourself a message. Well, how do you know

1 that ever ends? Maybe it doesn't.

2 So if it never ends, you may also crop the global
3 stack. So there is a thing called recursion. And the
4 safety critical standards all say you're not allowed to use
5 it because there is a risk that you will just keep growing
6 the stack and overwriting your code, but Toyota uses it.

7 Q What you have highlighted says that recursion carries
8 with it the danger of it exceeding available stack space
9 which can be a serious error?

10 A That's right. So this MISRA-C rule number 70, and
11 Toyota violated this rule. The other MISRA rules are the
12 same kind of idea, if you do this, you're really taking a
13 change; that's why you shouldn't do it.

14 Q Let's talk about peer reviews.

15 A So peer reviews are where you have someone other than
16 the author take a look at the software. This is
17 proofreading your term paper, you are never going to catch
18 your own typos.

19 Q Why is that important?

20 A It is important because no one ever catches their own
21 things. But it has been documented that you will find half
22 or two thirds of your defects doing it this way. An IBM
23 document that was actually invented in the mid-'70s and in
24 the '80s they documented it. Basically everybody knows that
25 peer reviews are a good way to find bugs; that's why it is

1 part of a good safety critical design process.

2 Q Was Toyota's peer reviews adequate?

3 A I can't find any written evidence of peer reviews
4 being conducted or find any defects. I know that there were
5 informal meetings, and I know that Mr. Ishii said sometimes
6 we take a look at the code. But if you're running safety
7 critical system software, you always take a look at the code
8 and you write down whether you found problems.

9 The reason that you write them down is that if your
10 peer reviews aren't working you can tell because you didn't
11 find anything. If you are not keeping track, you don't know
12 if they're working.

13 Q You also talk about concurrency and timing defects
14 and how they affect safety; is that right?

15 A Right. So I'm just going to limit it just to a
16 couple of things. There is a thing called task death. So
17 when you're running windows or Mac OS you have a bunch of
18 programs running. If one of the programs dies, that is a
19 task, and sometimes they die. And that happens in embedded
20 systems as well.

21 And the accepted practice is if a task dies you are
22 supposed to notice it and you are supposed to restart the
23 task or restart the system. Because if that task is
24 important, you are going to have a system that is
25 malfunctioning.

1 And here is how you can detect it: A watchdog
2 timer is a thing that detects this. So the main CPU kicks a
3 thing called the watchdog; that is what people call it, they
4 call it picking or petting. But there is a Watchdog, it is
5 a timer that just counts to zero. If it hits zero, it
6 resets the system.

7 So the software's job is every once in a while to
8 go out and kick or pet this watchdog and say, I'm still
9 alive, everything is still okay. The big reason that you
10 use this is to find if a task died. If all the tasks all
11 have to cooperate and you say there is ten tasks, there is
12 20 tasks, when you kick the watchdog, you need to make sure
13 all 10 or 20 tasks are alive. If any one died, then you
14 reset the system then you say something is wrong, let's
15 start again.

16 Q What is your concern here?

17 A My concern is that Toyota didn't do this properly.
18 To be correct and accepted, any single task death has to let
19 the watchdog reset the system. In Toyota, there is only a
20 few tasks that when they die it resets the system. Most
21 tasks, when they die, the watchdog timer doesn't reset. So
22 that's fundamentally not in accordance with accepted
23 practices.

24 Q I want us to skip this. Go to 12.

25 A Okay.

1 Q And tell us what you're showing up here.

2 A So this is the last two slides. This one is talking
3 about the NASA UA report. So this is the report that NASA
4 looked at the Toyota things, and we know that they didn't
5 get to see everything. But they looked at a lot of things,
6 they spent a lot of effort.

7 what they concluded, it is important to be precise
8 about what they concluded. What they said was they never
9 said it was safe. What they said was they couldn't find a
10 reproduceable defect that resulted in the kind of UA they
11 were looking for. And we know it is often hard to pin these
12 things down, so that's what they found.

13 But they also said because proof that the ETCS-i
14 caused the reported UAs was not found does not mean it could
15 not occur. So NASA never said it couldn't happen, they just
16 said they didn't find it.

17 Q What they did find was a single point of failure,
18 correct?

19 A But they did find a single point of failure. As we
20 discussed referencing the Hammett paper, when I read the
21 NASA report, they're telling me that they found a single
22 point of failure.

23 Q And your next slide.

24 A And these are my high-level opinions. So I think
25 that the Toyota ETCS is defective. I think it is

1 dangerous. It has a single point of failure. Both chips,
2 even though there is two chips, they are in one fault
3 containment region, which means no matter how hard you try
4 to put in failsafes, there is always going to be a case that
5 it can't check itself and it will have a dangerous failure.

6 I didn't talk about this in the slide, but there is
7 some issues with the realtime scheduling that Mr. Barr will
8 talk about. The watchdog timer doesn't detected task deaths
9 the way it is supposed to, and that is a bread-and-butter
10 safety thing, the first thing you look for in a safety
11 system -- second thing.

12 The first thing you look for is a single point of
13 failure. The second thing you look for is whether the
14 watchdog is right or not, and they got that wrong.

15 Toyota did not follow MISRA software guidelines or
16 any guidelines that I can find that are comparable enough to
17 get you safe. These things could be fixed. They have two
18 chips. They didn't use them in the right way.

19 MR. PORTIS: Your Honor, other than offering
20 exhibits, we will tender the witness.

21 THE COURT: Thank you. Mr. Bibb.

22 MR. CLARK: Thank you, your Honor.

23 CROSS-EXAMINATION

24 BY MR. BIBB:

25 Q Good afternoon, Professor Koopman.

1 A Good afternoon.

2 Q Is it pronounced Koopman or Copeman or Cokeman?

3 A Koopman.

4 Q Okay. We have had some debate. It is spelled
5 K-O-O-P-M-A-N, right?

6 A That's correct.

7 Q And a lot of us in this part of the world would call
8 that Koopman, as opposed to Koopman. If I lapse into that,
9 please don't take any disrespect from me on that, it is just
10 habit, okay?

11 A That's fine.

12 Q Now, I understand that you first were engaged in
13 studying the Toyota electronic throttle control system June
14 the 15, 2012. Does that sound right?

15 A That sounds about right.

16 Q And you reached your opinions and produced a 96-page
17 report finding many, if not all, of the flaws in the system
18 that you've described to this jury in the last several hours
19 in about 30 days; is that right?

20 A That sounds about right.

21 Q You spent a month to come up with the opinions that
22 you've come to today; is that right?

23 A It was about a month of calendar time. Yes.

24 Q Now, I understand that you used your own methodology
25 in coming to your conclusions that UA is caused --

1 unintended acceleration could be caused by Toyota's
2 electronic throttle control system; is that correct?

3 A I'm not sure if that's entirely correct. It depends
4 by what you mean by my methodology. I certainly didn't make
5 up something out of thin air.

6 Q Good. Good. Because you have been very critical of
7 Toyota's coding because you didn't feel they followed
8 recognized methodology, for example, in MISRA; is that
9 right?

10 A That's right.

11 Q And in a prior deposition, were you not asked about
12 where you came up with the methodology that you've utilized
13 here? And the questions were:

14 "Do you recall this? And this methodology that you used
15 here on this hypothesis that UA is caused by ETCS,
16 that's electronic throttle control system, that's your
17 own methodology, correct, you didn't borrow that
18 from anybody else?"

19 Does that sound familiar to you, that question?

20 A I remember something like that, but I would really
21 like to see the --

22 Q Fair enough.

23 A -- details so I can have the context.

24 Q Fair enough. Let me get you a copy of that
25 transcript. In fact, I will bring you a copy of a couple of

1 transcripts that you have got.

2 (The following bench conference was had outside the
3 hearing of the jury:)

4 MR. PORTIS: Your Honor, I'm fine with this.
5 Obviously the proper way is to use a deposition when he
6 testifies contrary to what he testified earlier, I don't
7 think you have established. I'm fine with it this time, but
8 I want you to do that from now on if that's okay.

9 THE COURT: Okay.

10 (Within hearing of the jury:)

11 Q (By Mr. Bibb) I will give you that one too. Let's
12 turn over to page 324, Dr. Koopman. And I want to direct
13 your attention to lines 9 through 13. Have you found your
14 place?

15 A Yes.

16 Q And the question very simply is, Dr. Koopman:
17 "Is this methodology, this work that you have shown the
18 jury for the last several hours, this methodology here
19 on this hypothesis that UA is caused by ETCS, that is
20 the unintended acceleration is caused by the electronic
21 throttle control system, that's your own methodology,
22 correct, you didn't borrow that from anybody else?"

23 And what did you answer?

24 A I said there I didn't get this picture from anywhere
25 else. But I believe later in the deposition I explained

1 that it was roughly analogous to a fault tree.

2 Q If you go further down that page, did you not testify
3 that:

4 "This is my own methodology, it is not a standard
5 methodology I found someplace."

6 Do you recall telling us that?

7 A Can you repeat the page number and line.

8 Q Start, the question begins at page 324, line 23,
9 through 325, line 2.

10 A So I'm testify that it was a way to articulate a
11 scientific --

12 Q No. That is the question is:

13 "Did you answer the question this is not a methodology
14 you adopted from somebody else?"

15 Is it your answer:

16 "This is not. This is my own methodology. It is not a
17 standard methodology I found someplace."

18 Is that the testimony that you gave under oath at
19 that time?

20 A I'm sorry. Can you give me the page and line number
21 again.

22 Q Page 324, line 23.

23 A Okay.

24 Q Through page 325, line 2.

25 A That is what I testified, but it was not about the

1 things I've been talking about today. It was something very
2 specific to the Van Alfen case.

3 Q Well, it appears to be very general here. You
4 haven't been suggesting that the software, the hardware of
5 this system somehow makes it prone to unintended
6 acceleration, haven't you?

7 A The context of this question and answer was with
8 regard to a particular picture that was in the Van Alfen
9 report. I've not used that picture. I've not used anything
10 like it in forming my opinions. This was on top and beyond
11 everything that I said today.

12 Q Okay. Do you know of anyone in the automotive field
13 that has used your methodology?

14 A The methodology of how I got what I'm saying today is
15 to look at the MISRA software guidelines and look at best
16 practices and to decide whether they were followed or not.
17 And I think anyone who does -- analyzes software safety uses
18 that methodology, among others.

19 Q How many electronic throttle control systems or
20 hardware or software for a production motor vehicle has Dr.
21 Koopman designed?

22 A For a production motor vehicle I have not designed
23 one.

24 Q Zero, correct?

25 A That is correct.

1 Q And it's pretty easy to come in and criticize the
2 work of somebody who does this for a living, isn't it, a
3 college professor comes in, says they got it all wrong, a
4 company that builds millions of automobiles every year;
5 that's what you have done today, haven't you? You have done
6 it in 33 days; isn't that right?

7 A I think what I presented today goes beyond what that
8 initial report was. The initial report was fairly limited.
9 I certainly identified a single point of failure in the
10 initial report. But I've had a lot of safety experience. I
11 worked on safety critical car software.

12 My current research is how to make autonomous
13 vehicles safe. So I have not actually done the -- written
14 the code for electronic throttle control system, but that's
15 not the same as not knowing about it.

16 Q And you know what the jury is doing in this case,
17 they're trying to determine whether or who should be
18 responsible for the crash that Ms. Bookout was involved in
19 and Ms. Schwarz on September 20, 2007, you know that, right?

20 A I understand.

21 Q And before you got involved with lawyers representing
22 the plaintiffs against Toyota in unintended acceleration
23 claims, you had never investigated any kind of automobile
24 crash before; isn't that correct?

25 A I had done work on safety shutdown system for

1 automobiles, but I had not done a crash investigation.

2 Q You got that transcript still handy up there? I will
3 direct your attention to page 207. And this again is
4 talking -- I think you're right. You're talking about that
5 you never investigated an automobile crash, but you worked
6 on this ground vehicle, that unmanned ground vehicle that
7 you mentioned earlier, right?

8 A That's correct.

9 Q And the unmanned ground vehicle, by its very name, is
10 it doesn't have a driver in it, does it?

11 A It at times has a driver who is outside the vehicle
12 using a remote control. There is nobody sitting in the
13 vehicle.

14 Q Nobody sitting in the car.

15 A There are, however, people who can get run over by
16 it, so it is still safety critical.

17 Q When were you retained to work in the Bookout case?

18 A I don't remember an exact date. It was certainly
19 more recently.

20 Q Was it within the last year?

21 A I didn't look that up.

22 Q Okay. I understand that you charge, at least on the
23 CV that I got with your transcript \$580 per hour for your
24 expert witness services; is that right?

25 A That's what I charge all my expert witness clients.

1 Q And when -- I understand when you work and take, when
2 you give depositions, or you testify in trial like this,
3 your charge runs portal to portal, correct?

4 A That's correct.

5 Q And that means you charge from the moment you leave
6 your house to the moment you get back home to your house,
7 correct?

8 A That is correct, but there is a maximum. And my
9 experience is I usually work more hour than I'm actually
10 charging for.

11 Q And you charge not only a maximum of 12 hours a day
12 at \$580 an hour, you also have a minimum charge, do you not?

13 A I have a minimum of one day to do those events.

14 Q You have a minimum charge. If you came and spent an
15 hour of doing expert witness services, a minimum charge of
16 eight hours per day, correct?

17 A That's correct. And what I found is that I have to
18 set the whole day aside. And I'm pretty wiped out by the
19 end, so I lose a day either way.

20 Q Okay. Now let's talk about the work that you've
21 actually done for the Bookout case, okay?

22 A Okay.

23 Q When did you inspect Mrs. Bookout's vehicle?

24 A I've not physically seen the vehicle. What I did was
25 I looked at pictures of the vehicle.

1 Q So when did you go to the location where Ms.
2 Bookout's crash occurred outside of Eufaula, Oklahoma?

3 A I've not physically been there. I looked at pictures
4 of the crash scene, and I used Google earth to virtually
5 walk around and get an idea.

6 Q So you haven't seen the car, and you haven't seen the
7 scene, fair enough?

8 A Not in person.

9 Q And you have not inspected any components from Ms.
10 Bookout's car, have you?

11 A Not from her vehicle.

12 Q Have you reviewed the reports of either Mr. McCort or
13 Mr. Stopschinski the accident reconstructionist in this case
14 to get an idea of the speeds and distances involved?

15 A I've seen summaries of those reports, but I've not
16 been through them in detail.

17 Q You read summaries of the reports?

18 A Yes.

19 Q Were they furnished to you by the plaintiffs'
20 lawyers?

21 A I don't recall where I saw them.

22 Q When did you see them?

23 A I saw them when I initially got all the documents. I
24 read through everything that was provided to me.

25 Q Was that several months ago, or just last week?

1 A It was more than last week. It was before my
2 deposition. I don't have a date for you.

3 Q And your deposition in this case was the very end of
4 July as I recall?

5 A Sounds about right.

6 Q Now, you know that the Bookout vehicle has been
7 inspected by Mr. McCort and Mr. Stopschinski, right?

8 A That's my understanding.

9 Q And it has been inspected by Mr. Loudon and Dr. Van
10 Schoor and Mr. Hannemann and Mr. Walker and Mr. Osterhow
11 (phonetic) and Mr. Cheek and Mr. Livernois and Mr. Powell
12 and Dr. Young and Dr. Catherine Corrigan. You know they all
13 looked at the vehicle. Were you aware of those?

14 A Some of those names I recall. I don't recall the
15 entire list. I know that it was inspected.

16 Q And you're aware that all of these engineers and
17 scientists have looked at her car and have found nothing
18 with either the engine or the brakes of her car that could
19 account for this accident, aren't you?

20 A I'm not prepared to opine on that.

21 Q All right. My question is: So you don't know that
22 they haven't found anything wrong with the engine or the
23 brakes that can account for this accident; you just don't
24 know?

25 A I just don't know.

1 Q But you do know that Ms. Bookout drove this car for
2 two years and 9,600 miles and never had any problem with the
3 engine or the brakes on this car, correct, you knew that?

4 A I read her deposition testimony, and that's my
5 understanding.

6 Q All right. You are not offering opinions to this
7 jury in the several hours that you have been on the witness
8 stand today that there was some software defect or
9 combination of software defects that has led to an alleged
10 unintended acceleration of Ms. Bookout's car about 6:30 in
11 the evening on September 20, 2007, are you?

12 A My opinion is, as I said at my deposition, is that is
13 the facts of this accident are consistent with my opinions.
14 But I'm not offering a specific causation opinion.

15 Q I think in your deposition you were quite clear that
16 you were not offering an opinion that -- as to whether the
17 electronic throttle control system in Ms. Bookout's car was
18 -- and I think in your words it was the proximate likely
19 cause of the crash, you were not offering that opinion,
20 correct?

21 A I'm not offering that opinion.

22 Q You have come all the way from Pittsburgh,
23 Pennsylvania, and you have spent most of the day on the
24 stand talking about the Toyota electronic throttle control
25 system, but you don't have an opinion as to whether it

1 caused this crash; that's what you're telling this jury?

2 A I have an opinion that it is a possible cause, that
3 it is defective and it is unsafe. But I do not have an
4 opinion whether it was for sure the proximate cause of the
5 crash.

6 Q A likely cause is what you said the approximate
7 likely cause of this crash, you do not have that opinion, do
8 you?

9 A I do not have an opinion on that.

10 Q Because the question that you were asked is if you
11 have an opinion.

12 "Can I ask you if you have an opinion within a
13 reasonable degree of scientific certainty that the
14 unsafe condition of the electronic throttle control
15 system in the Bookout vehicle as alleged by you was the
16 most likely cause of that mishap and crash?"

17 Didn't you answer that question:

18 "I don't have the an opinion on whether it was the
19 approximate likely cause."

20 A That sounds about right, and I agree with that
21 statement that I made.

22 Q All right. Now, in fact, one reason is you hadn't
23 done the work necessary to reach that opinion, correct?

24 A This are two reasons. One was I wasn't asked to do
25 that. The other one is I have not done the work necessary

1 to reach that conclusion.

2 Q Likewise, you do not have -- you haven't tried to
3 extend your analysis of the work you have done in this case
4 to the rigorous and formal process that would be necessary
5 to identify the cause of this crash, correct?

6 A No, I've not. My understanding is that other experts
7 will be doing that.

8 Q And you do not have an opinion as to whether there
9 was some fault that caused the throttle to stick, or some
10 fault that caused the throttle to open and then stick in Ms.
11 Bookout's car at the time of the crash, correct?

12 A I don't have an opinion that that's specifically what
13 for sure happened. I do have an opinion that the design is
14 unsafe and defective and that could certainly happen.

15 Q Well, we don't -- is it more likely than not? You
16 haven't reach that opinion, have you?

17 A That's correct. I've not reached an opinion of more
18 likely than not.

19 Q If you were to look at an unintended acceleration
20 incident, there are three causes that you would have to
21 investigate, right? You need to look at -- one would be
22 mechanical causes of the event, correct, need to look at
23 that?

24 A I'm not quite sure of my role, because I'm not here
25 to represent myself as an accident investigation expert. So

1 I can answer based on what I know, but I don't feel
2 comfortable opining what you would do in an accident
3 investigation.

4 Q I believe you've testified previously the one thing
5 that you want to look at is the mechanical causes of the
6 accident; do you recall that?

7 A Subject to what I just said, mechanical cause could
8 certainly be a cause.

9 Q And another thing you would want to consider would be
10 the electronic or electrical cause, correct?

11 A Electronic, electrical, including software, that
12 would be something you would consider.

13 Q And the third factor would be to consider human
14 causes of the crash, right?

15 A Human causes could also be a cause of the crash.
16 Yes.

17 Q And human causes would include errors in pedal
18 application, correct?

19 A My understanding is that's something you would
20 consider. Yes.

21 Q In fact, you have done some reading in the field of
22 unintended acceleration, have you not?

23 A I've done some reading. Yes.

24 Q And I think you have looked at the phenomena of pedal
25 misapplication to some extent, have you not?

1 A To some extent.

2 Q So I believe you told us in a prior deposition that
3 you had an interest in unintended acceleration for several
4 years; does that sound right?

5 A I would like to see the deposition and the quote,
6 please.

7 Q Okay. If you can -- you have it up there. Turn over
8 to page 256.

9 A Okay. I'm at that page.

10 Q You're at that page? If you turn and look at line 9.

11 A Yes. Okay. I see the --

12 Q See the answer on line 16:

13 "I read plenty on that topic."

14 A Yes.

15 Q And among other things that you read on that topic,
16 being unintended acceleration, you've -- didn't you tell us
17 that you reviewed several studies by NASA and NHTSA? If the
18 you want to refer to it, it is page 254.

19 A I recall taking a look at those studies. Yes.

20 Q On page 257, didn't you tell us that you reviewed
21 several NTSB studies on pedal misapplication or specific
22 accidents involving unintended acceleration?

23 A Sorry. Page?

24 Q 257, line 10.

25 A Right. And what I said was I didn't recall

1 specifically if they were NHTSA or NTSB, but those would be
2 the kind of studies that I was look at.

3 Q And I believe in the course of that deposition were
4 you not asked to take a look at an NTSB study on pedal
5 misapplication from 2009?

6 MR. PORTIS: Your Honor.

7 THE COURT: Please approach.

8 (The following bench conference was had outside the
9 hearing of the jury:)

10 THE COURT: Mr. Bibb, you have to ask him a
11 question first. You can't ask him what he said in his
12 deposition. Ask him a question first. If he doesn't answer
13 the way that he did in the deposition you can use the
14 deposition.

15 MR. BIBB: I will be glad to do that.

16 MR. PORTIS: Secondarily, your Honor, the question
17 about a pedal misapplication is beyond the scope of direct
18 examination.

19 MR. BIBB: That is fair game.

20 MR. BEASLEY: He is not an accident
21 reconstructionist. And he is not put up for that.

22 MR. BIBB: But he has read theses studies.

23 THE COURT: Did he give an opinion on this in any
24 of these cases?

25 MR. PORTIS: No, ma'am. It is not in his report.

1 THE COURT: Did he testify at --

2 MR. TAWWATER: Here is what counsel is about to law
3 this into, your Honor. If he starts going into other cases
4 and start talking about this stuff, we will start going into
5 other cases.

6 MR. BIBB: I have attempted not to use that name.
7 You have asked me which deposition he is reading from. This
8 is what I want to refer to it. I want to show his bias.

9 THE COURT: What are you reading from here?

10 MR. BIBB: I want to read that's something I've
11 never really bought into it. It is the 2009 NTSB study on
12 pedal misapplication.

13 THE COURT: So that's you're reading him?

14 MR. BIBB: That is the quote from the study. And I
15 assume that he read that before. I didn't ask him for it.
16 That's certainly something that he said a lot, And I frankly
17 never bought into that. I want to show bias on this
18 witness's part.

19 THE COURT: Okay. Okay.

20 MR. PORTIS: No objection.

21 (Within hearing of jury:)

22 Q (By Mr. Bibb) what I would like to ask you, Dr.
23 Koopman, if you will take a look over at page 268.

24 MR. PORTIS: Same objection, your Honor.

25 THE COURT: Just ask him the question.

1 MR. BIBB: I just want to sort of set him up so he
2 won't have to ask me where to look.

3 Q (By Mr. Bibb) You were shown --

4 THE COURT: Mr. Bibb, the way to do this is just
5 ask him the questions about the study. If he doesn't and if
6 need to use -- please approach.

7 MR. BIBB: Let me try again.

8 THE COURT: Don't just ask him questions out of the
9 deposition.

10 Q (By Mr. Bibb) My question to you, you've never, Dr.
11 Koopman, bought into the -- really never bought into pedal
12 application as the only reason for unintended acceleration?

13 A Since we have been talking about this study, I
14 remember reading this study. It was a study from fairly
15 recently, but it was only talking about cars that were
16 designed before electronic throttle control. There were two
17 of the references that were early. One I said I didn't
18 know. After the deposition, I went and looked it up, and it
19 was an even older car.

20 we're talking about a study here that found that
21 pedal misapplication was a common cause for unintended
22 acceleration on cars that didn't have computers in the
23 throttle control. Then what I said was I never really
24 bought that it's the only reason for an unintended
25 acceleration; that's what I said.

1 I didn't say I ignore human -- unintended
2 acceleration from pedal misapplication. What I said was if
3 somebody tells me for here it is always the driver who made
4 a mistake, there is no way the software could do that, I
5 don't believe that.

6 Q Do you know of a way of pressing on the brake pedal
7 to cause the vehicle to accelerate?

8 A I don't know of a way that solely pressing the brake
9 pedal causes it to accelerate. What I do know, what I've
10 seen from analysis from other experts is there is some
11 situations that failure to release the brake pedal can
12 result in a scenario where the car accelerates even though
13 your foot is on the brake. That is a fine point that I
14 really would rather have the other experts testify about.

15 Q Merely just my simple scenario of just stepping on
16 the brake pedal, do you know of any way that would cause the
17 vehicle to accelerate?

18 A If stepping on the brake pedal somehow activates a
19 software bug in the ETCS, which is monitoring the brake
20 pedal, it could possibly do that. But I can't lay out a
21 specific mechanism for that.

22 Q Did you not tell us in your deposition that none of
23 the electronic failures that you have described has a direct
24 effect on the hydraulic brakes? Correct?

25 A So this has been in a couple of depositions. I don't

1 know of any electronic failure that would directly affect
2 the hydraulic brakes. But there can be indirect effects in
3 the following way: If an electronic failure, software or
4 hardware failure causes the throttle to open, my
5 understanding is that the vacuum depletion reduce brake
6 effectiveness. So I would consider that an indirect effect.

7 Q My question is then the converse, meanly stepping on
8 the hydraulic brakes, does that have anything to do with
9 causing the throttle to open?

10 A I'm not aware of a specific scenario that causes
11 that.

12 Q The hydraulic brakes are mechanical and hydraulic in
13 nature, are they not?

14 A They're mechanical and hydraulic. However, when you
15 press on the brakes it also activates brake switches. Those
16 brake switches do go the electronic throttle control system;
17 that's why my answer has the carve out that there is always
18 a possibility of something.

19 Q We will come back to the brakes switches and their
20 effect on this system right up here in just a few minutes.
21 You have not tried to reconstruct the throttle angle of Ms.
22 Bookout's vehicle at the time she was coming down the ramp
23 off of Highway 69 on Texana Road, have you?

24 A I have not.

25 Q And you haven't formed an opinion as to what angle of

1 throttle is necessary to allow for the depletion of vacuum
2 assist to the power brakes caused by pumping the brake
3 pedal, have you?

4 A I have not. Other experts are looking into that.

5 Q Now, you've talked in -- and I would like to go back
6 and take a look at some of these slides -- I will use mine
7 up here -- about some of the things that you have put in
8 your report. One of them that I would like to going to is
9 this slide about how often the random faults happen. And
10 are you saying down there that you have a UA event every
11 11.6 days?

12 A That's a dangerous fault. There are probably other
13 dangerous faults other than wide-open throttle UA. But
14 these are general numbers, so this is not specific to the
15 Toyota ETCS, but rather industry standard numbers that when
16 you do this will analysis I would expect a dangerous fault
17 every 11.6 days.

18 But there is a slide I skipped that is very
19 relevant to this, and it is that a dangerous fault can
20 result in a UA, but that doesn't mean that there is a crash
21 and somebody dies. There is a notion of a fault creates a
22 hazard, a hazard is dangerous. That is an incident, and an
23 incident is something could go wrong but maybe you catch a
24 lucky break, maybe you don't. So that number is about
25 incidents, not about accidents.

1 Q And I want to make it clear to the jury: You're not
2 saying that you have a UA event every 11.6 days because of
3 all the stuff that you talked about today, right?

4 A What I'm say --

5 Q Yes or no on that, and please explain. You're not
6 telling us that, are you?

7 A I believe I'm saying yes, but in a very constrained
8 way. The very constrained way is that these are standard
9 numbers. If I saw a system like this, in general someone
10 said, Here is a system, here is the chips they have, I would
11 say, you know, that's about the number that I would expect
12 to see, but if you want an exact number you would have to go
13 a lot more detail.

14 I'm not saying that is the exact number. The point
15 is, and it says at the bottom, the point isn't the number.
16 It says the numbers are not approximate. The point is you
17 can expect it to happen. It is not once every hundred
18 years, it is on a regular basis. That is the point of this
19 slide.

20 Q Let's say this 2005 Camry -- and I would assume and
21 it has now been on the road now for eight years, you would
22 expect to see more and more of these incidents occurring
23 from this 2005 Camry, wouldn't you?

24 A I would expect to see a lot of incidents happening
25 based on this. The thing that I have not accounted for is

1 tha the failsafes are going to be somewhat effective and
2 reduce the collapse of the incident down to an, Okay, it is
3 no problem, and I haven't put a factor in. That is saying I
4 guess it is more appropriate to say I would expect the
5 failsafes to be exercised that often. To the degree they're
6 not effective, you will get things that will punch all the
7 way through to an accident.

8 Q We will talk about those failsafes, because we did
9 kind of skip over that in your slide show. Do you know
10 Professor Paul Fischbeck at Carnegie Mellon?

11 A I've heard his name. I have not met him personally.

12 Q He is like in their statistics department, right?

13 A That's my understanding.

14 Q Have you seen his analysis where he went back and
15 counted to see the number of complaints about UA and its
16 correlation to the publicity?

17 A I've not read that work. I understand it exists.

18 Q And you would agree with me that after the publicity
19 about Toyota UA died down in the spring of 2010, the number
20 of complaints went back to where they were before the
21 publicity?

22 A Well, I'm not a statistics person.

23 Q Well, you have given us statistics here though.

24 A As an ordinary person, I would have to point out that
25 in making that argument we're talking about the number of

1 reports complaints, not the number of times that it actually
2 happens.

3 MR. PORTIS: Again, this is beyond.

4 MR. BIBB: Think it is impeachment of his
5 statistics that he put up there.

6 THE COURT: Overruled.

7 MR. PORTIS: So we are going to get into each
8 side's statistics now?

9 THE COURT: Overruled.

10 MR. BIBB: I have two slides.

11 Q (By Mr. Bibb) What happened to the incidents? Have
12 they stopped? I'm sure you will agree with me Toyota hasn't
13 found and fixed the problem, have they?

14 A So this isn't my data, this is the first time I've
15 seen it. But I would say as a nonexpert in statistics to me
16 it is just as plausible that without the publicity they
17 stopped bothering to report it. I know plenty of times my
18 computer crashed and I don't call it in.

19 Q He just counted the number of claims that came in and
20 sort of timing. In other words, when they were reported
21 versus when they occurred. The lighter purple or blue is
22 when they were reported, and the darker purple is when the
23 incident occurred. Do you understand the chart?

24 A I understand. But my numbers are not about this. My
25 numbers are about something dangerous happened. If you

1 press the brakes and it immediately goes away, and it
2 doesn't happen again. You say, I'm not going to waste hours
3 of my life calling this in and reporting it. So these
4 numbers are not comparable to the numbers I was showing.

5 Q Here is another one, Dr. Fischbeck. This was a
6 presentation he gave to the National Highway Traffic Safety
7 Administration. Again, here we are counting back months
8 from the date of the news coverage, and then afterwards.

9 Let's go on. Now, I would like to talk to you a
10 little bit about the NASA report. You referred to it a lot
11 in your slide show.

12 A Right. My slide show referred to the main NASA
13 report and also to appendix A on software.

14 Q And I will just use some of the pages that you
15 actually cited in your NASA report. Here it is. First of
16 all you have the line here that NASA says the Toyota
17 electronic throttle control system has a dangerous single
18 point of failure. That sentence never appears in the NASA
19 report, does it?

20 A It does not appear in those words. They use words
21 that to me as an expert in software, that's what they were
22 intending to communicate.

23 Q That's what you say it says, that's not what NASA
24 says?

25 A They do not use those exact words.

1 Q And then you use this quotation here from -- and you
2 have it cited on pages 65 and 67 to suggest that it's a --
3 to say that it is a simplex system, don't disagree, they use
4 that term. But maybe what we ought to do is look at the
5 language that appears right around the quotes that you have
6 there.

7 And this is -- let's go to the next page. Can you
8 make the top paragraph there bigger. This is from page 66,
9 and you have got the quote here about the sub CPU and its
10 path to disengage power to the H-bridge controlling the
11 throttle motor should a fault occur architecturally. I
12 think you even read this to the jury:

13 "Architecturally the system appears as a simplex system
14 with disengagement monitor and diverse safety."

15 Is that right?

16 A That's what it says.

17 Q The next sentence, though, goes on to say:

18 "Without power, the throttle cannot be driven, and dual
19 springs return the valve to a near-idle position as
20 required by FMVSS 126, 6 1/2 degrees from fully closed."

21 So there is a mechanical backup to close the spring that
22 closes the throttle, two springs to close the throttle if
23 there is some failure to the throttle motor. Once power is
24 cut off to the throttle motor, it doesn't stick there, it
25 closes, correct?

1 A If the failure of the ETCS results in the power to
2 throttle motor being cut that's what happens, but that's not
3 necessarily how it is going to fail.

4 Q And you know that there are failsafes to cut power to
5 the throttle motor, right?

6 A There are failsafes corresponding to the built-in
7 tests that I explained, and they will sometime cut power to
8 the throttle motor, but it is not guaranteed to happen every
9 time.

10 Q Every time -- now, you know, because we will talk
11 about it in a minute with about Mr. Barr's taking or
12 removing some lines of software code and some testing that
13 was done that you cite in your first report on this that
14 took out the failsafes. And you know from the testing done,
15 though, that every time the brake was applied in those tests
16 the throttle motor power was cut and the throttle returned
17 to the closed position, correct? And we will talk about
18 that a little bit more. You know about that?

19 A There were a bunch of pieces to that, but I think
20 what we're getting to on that is there were many tests that
21 were run. And if you did something like kill a task -- I
22 talked about task -- they killed a task and said, Look, you
23 have unintended acceleration. And if eventually get around
24 to pressing the brake, with one exception I will get to, it
25 will then save the engine. But sometimes that happened

1 seconds and seconds and minutes later.

2 If you waited all day to press the brake, it was
3 going to wait all day before it shut down. So the driver
4 had to resolve the UA by pressing the brake. There is also,
5 one of the slides that we skipped, talked about testimony
6 from Mr. Arora that there is a case where if your foot is
7 already on the brake and one of these tasks dies, if you
8 don't let all the way up on the brake, if you keep your foot
9 on the brake, having your foot on the brake will not resolve
10 UA, the UA will continue. In that case, you have to remove
11 your foot all the way from the brake to get the car to stop.

12 Q Now, in all the tests that were run by Mr. Loudon
13 that you referred to in your report and Mr. Barr, the
14 throttle closed every time within a blink of an eye, didn't
15 it, when the brake was applied?

16 A That's correct. But the context is the UA occurred,
17 the system was experiencing the UA for however arbitrary
18 long time. When you eventually got around on those tests to
19 pressing the brake then the failsafes kicked in.

20 Q This goes on and talks -- if we can go back a page to
21 the colorful diagram because it talks about this diagram.
22 The next couple of sentences. And it shows various ways
23 that it is going to cut off. This is the overall
24 architecture for disengagement, diverse safety, what you
25 were talking about, right?

1 A Sure. This is how NASA detected the failsafes.

2 Q And you had failsafes when there was a disagreement
3 between the monitor and main CPU and the brake was applied
4 power was cut to the throttle motor, throttle motor closed.
5 If there were further problems, you always had the brakes
6 which would stop the vehicle, shift to neutral, ignition
7 off. This almost looks like your fault tree there, doesn't
8 it?

9 A This certainly does look kind of like a fault tree.
10 I would point out that the --

11 Q There is not a question about what you want to point
12 out?

13 THE COURT: You can bring it up on redirect.

14 MR. PORTIS: What exhibit is that?

15 MR. BIBB: That is page 65 from the NESC, the NASA
16 engineering report.

17 Q (By Mr. Bibb) Now, if we can go back one more page
18 Mr. Doyle. This is the system failsafe architecture that
19 you lifted the quote that you have your slide from?

20 A Looks about right. The font is pretty small from
21 here.

22 Q We will blow that up here. The NASA, the National
23 Aeronautics and Space Administration, you see them at the
24 top there, but they have the shaded box. And they would
25 periodically include findings during the course of a report,

1 didn't they?

2 A Yes. This is a summary box of findings.

3 Q Right. And the finding in this section of the report
4 is that:

5 "Safety features are designed into the Toyota Motor
6 Corporation electronic throttle control system to guard
7 against large throttle opening, unintended acceleration
8 from single and some double electronic throttle control
9 system failures. Multiple independent safety features
10 include detecting failures and initiating safe mode such
11 as limp home modes and fuel-cut strategies."

12 That was the finding that NASA made; isn't that
13 correct?

14 A That is one of their findings.

15 Q All right. You didn't show that to the jury as part
16 of your PowerPoint. Did you?

17 A No, I did not.

18 Q Now, let me just touch for a moment on fault
19 containment regions. You talked about fault containment
20 regions. All you have done there is to point to a location
21 where things are in the same area. Correct?

22 A Area is a little loose. In the same chip.

23 Q Do you call them region?

24 A Well, region is the term of art. But, for example,
25 the A/D converter is all in the same portion of the same

1 chip, for example.

2 Q But you did not look to see what Toyota has done to
3 mitigate faults in that area or in a region, have you?

4 A I looked at the FMAA, which we saw. I looked at many
5 of the failsafes. But the fact of the matter is it doesn't
6 matter what you do to mitigate it except by putting in a
7 second independent fault containment region. There is no
8 magic that makes a single fault containment region safe.
9 The only way to fix it is a second one.

10 Q Have you examined the electronic throttle control
11 systems of any other vehicles sold in the 2005 model year to
12 see if they have separate fault containment areas for the
13 analog to digital converter?

14 A I have not looked at other 2005 model year vehicles.

15 Q All right. So you don't know if anybody has the
16 system that you say everybody has got to have, do you?

17 A I don't know of specific examples in that particular
18 model year.

19 Q The answer is I don't know, right? I don't know if
20 anybody has this separate analog to digital convertor, fault
21 containment, whatever you want to call it?

22 A I don't know for myself, but I know if they were
23 following MISRA standards it would require them to have
24 that.

25 Q Now, you talked about the analog-to-digital converter

1 for a long time, called it a single point failure; is that
2 correct?

3 A That is an example of a single point failure in the
4 Toyota ETCS.

5 Q Okay. Have you done any testing of vehicle
6 components or systems to see what effect Toyota's failsafes
7 and system guards would have on an analog-to-digital
8 converter failure?

9 A I've not myself done testing. Other experts have
10 done testing. But I have relied on the academic literature
11 that says that architecture pattern, building it that way
12 can be expected to result in UA.

13 Q But, again, the question simply to you was have you
14 done any testing and the answer was no, correct?

15 A Not myself.

16 Q All right. Now, you're not, again, not telling the
17 jury, though, that more likely than not an analog-to-digital
18 converter failure caused Ms. Bookout's crash at 6:30 p.m. on
19 September 20, 2007, are you?

20 A I'm not saying that.

21 Q And, in fact, you have not found any -- you're not
22 telling this jury of any other single point of failure that
23 in your opinion more likely or not caused Ms. Bookout's
24 crash in September of 2007, are you?

25 A No.

1 Q And have you heard of a mitigation strategy that
2 Toyota has called the Toyota system guard?

3 A I've heard of the three system guards.

4 Q A system guard one, system guard two, and system
5 guard three, are they not?

6 A Yes.

7 Q You don't know how those system guards work, do you?

8 A I've read up on them in general. It is looking for
9 mismatches between pedal and throttle.

10 Q You haven't personally tested any of the system guard
11 mitigation strategies, have you?

12 A I've not tested them.

13 Q And you have never suggested that Toyota's system
14 guards are defective, have you?

15 A I've not suggested that they're defective in terms of
16 doing what they're supposed to do. But I have suggested
17 they're defective in the fact that they're not a complete
18 safety system.

19 Q Have you testified that I don't believe I ever said
20 the control system guards were defective?

21 A Can we have the reference, please.

22 Q Page 366.

23 A This is still the Van Alfen?

24 Q Yes. And I'm not asking you about the watchdogs or
25 the monitor actuator safety architecture. All I want to

1 know about is the system guards?

2 A what I said was I don't believe I ever said that the
3 system guards were defective. When I said that it is in a
4 very narrow sense. What I mean is the system guard is
5 designed to implement certain failsafe functions. But I
6 don't have any belief they failed to do what they're
7 supposed to do.

8 But what I also said today was that doesn't make
9 them complete failsafes, they still leave holes. There is a
10 difference between saying they are not defective and saying
11 the ETCS is safe. I can say both things at the same time,
12 it is still consistent.

13 Q In any testing of the Toyota electronic throttle
14 control system that you're aware of, have the failsafes ever
15 failed to kick in when the brakes are applied or released?

16 A I don't know of specific testing that if you cycle
17 the brake switches from on to off or from off to on, I don't
18 know of any testing that failed to engage a failsafe under
19 those conditions.

20 Q You talked about the MISRA coding guidelines an awful
21 lot today. You can't trace any alleged violation by Toyota
22 of any MISRA guideline as the most likely cause of Ms.
23 Bookout's crash in September of 2007, can you?

24 A I can't go to a specific rule violation and say
25 that's what caused the crash.

1 Q Any rule violation, you can't say that?

2 A This is no rule violation that I can find that caused
3 the crash. But I should say that doesn't mean I tried and
4 didn't find one. I just haven't done that work.

5 Q And you were here for Mr. Ishii's videotaped
6 testimony today, were you not?

7 A Yes.

8 Q And you heard him say that at the time only five
9 automobile manufacturers were compliant with MISRA coding
10 standards. Do you remember that?

11 A I remember him saying that.

12 Q Okay. Now, you talked -- you mentioned earlier today
13 that in talking about coding that people make mistakes. Do
14 you remember making that statement?

15 A Sure.

16 Q People make mistakes?

17 A Sure.

18 Q You said you miss things when you're proofreading.
19 Do you remember that?

20 A Happens to me all the time.

21 Q You say that is the reason you want peer reviews. Do
22 you recall that?

23 A That is a motivation for peer reviews. Absolutely.

24 Q And you know that -- he is still here -- Mr. Michael
25 Barr is one of the plaintiffs' experts in this case, do you

1 not?

2 A Yes.

3 Q And you know, and I think you referred to Mr. Barr,
4 as the plaintiffs' software witness in this case; is that
5 right?

6 A He is a software witness. I consider myself one as
7 well.

8 Q Right. And Mr. Barr, perhaps the jury knows this, he
9 does have access to the Toyota source code; does he not?

10 A Yes, he does.

11 Q And you know that initially Mr. Barr removed about 20
12 percent of the software code before he did his review of the
13 source code, correct?

14 A This is all secondhand from reading depositions and
15 so on. I know there was an incident of that nature.

16 Q Let me ask a different way. You understand that he
17 removed about 20 percent of the software code, correct?

18 A I understand that he was put in a difficult situation
19 and that he did some analysis that did not include some of
20 the source code.

21 Q And you understand that that included -- the lines of
22 code that were removed were lines of code that were relevant
23 to some of the safety measures in the Toyota system,
24 correct?

25 A I recall that being discussed, but I didn't dig in to

1 make sure of that for myself.

2 Q And you issued an earlier rebuttal report in which
3 you stated in paragraph 95 of that report that Mr. Barr's
4 monitor CPU report, that monitor CPU, that sub CPU that we
5 saw the slide on, maybe help refresh the jury's
6 recollection. I think we have a picture of it here in one
7 of your slides.

8 That that monitor CPU that I think is identified as
9 sub CPU up there, he identified as another lack of
10 independence in the throttle motor failsafe arrangement
11 because he reported that the monitor and the main CPU did
12 not independently cut power to the throttle motor, and the
13 main CPU or the throttle motor forming another single point
14 of failure. Do you remember that?

15 A I would like to see the reference that comes from.

16 Q Okay. Let me get you the report. May I approach?

17 THE COURT: Yes.

18 Q (By Mr. Bibb) I made it easy I flagged it and
19 highlighted it for you.

20 A Thank you.

21 Q Since I stumbled through reading it, read that back
22 to me to make sure I got it right.

23 A This is from the Van Alfen report, which is not the
24 report that I used in this case. And paragraph 95 in my
25 report said:

1 "Mr. Barr's CPU report identified another lack of
2 independence in the throttle motor failsafe arrangement.
3 He reports that the monitor and main CPUs do not
4 independently cut power to the throttle motor, forming
5 another single point of failure."

6 And I refer to Barr monitor CPU report in the Van
7 Alfen case, page 20.

8 Q All right. And after you wrote that -- what was that
9 dated?

10 A This is was September 17, 2012.

11 Q Just a year ago after you wrote that you learned that
12 the monitor CPU can independently cut power to the throttle
13 motor setting the vehicle at a 6.5 degrees failsafe; isn't
14 that correct?

15 A I don't remember the specific numbers you're
16 referring to. What I learned was that this paragraph was
17 based on a report. And the opinion I was basing it on
18 turned out to be incorrect.

19 Q It turned out -- and you relied on Mr. Barr a number
20 of times through this PowerPoint show, haven't you?

21 A Yes. And I've gone through fastidiously in the
22 report for St. John, which is the basis for this, to make
23 sure that none of my reliances on that one small part of all
24 Mr. Barr's work that turned out to be revised.

25 Q So you know that that conclusion in that report is

1 wrong, right?

2 A which conclusion. which report, sir?

3 Q Paragraph 95 that you read to the jury is wrong?

4 A That paragraph 95 is incorrect because it was based
5 on an incorrect opinion. But it does not affect, as far as
6 I know. Any of the other opinions in any of my other
7 reports.

8 Q Well, you say you don't rely on that, but you do rely
9 on a report that you prepared for St. John?

10 A That's correct.

11 Q And I show you your report from St. John. And I want
12 to direct your attention to -- why don't you read that to
13 yourself and tell me, Dr. Koopman, whether you were relying
14 on that work for your work in that report, the earlier work
15 for your report in that case.

16 A That's what I said here. I'm reading part of it:
17 "I've endeavored to only refer to opinions of other
18 experts which I believe also applied to the St. John
19 vehicle or likely be reiterated."

20 The reason that I did that was I was preparing this
21 report while Mr. Barr and his associates were preparing
22 their reports. So I didn't have the new reports to refer
23 to, so I used their old reports. But I said:

24 "Which -- only which I believe also apply."

25 It was clear in my mind that that one paragraph

1 didn't apply. It turned out that that wasn't true, so I'm
2 not relying on that part of that one report.

3 Q And, in fact, Dr. Koopman, you know that that mistake
4 by Mr. Barr has been proven not to occur in Toyota vehicles
5 equipped with the failsafes, correct, which is all Toyota
6 vehicles with electronic throttle control?

7 A I recall that being the result, but I don't remember
8 exactly where I saw it or how I saw that.

9 Q Okay. And you know that every time the brake pedal
10 was pressed the vehicle went into failsafe, correct?

11 A With the exception of the quote from Mr. Arora's
12 deposition which I refer to which requires the brake pedal
13 being released.

14 Q But the testing that was done by Mr. Loudon, who is
15 also an expert in this case using Mr. Barr's work, found
16 that every time that on that chassis dynamometer the brake
17 pedal was depressed, the vehicle went into failsafe,
18 correct?

19 A As I was going to complete my sentence, yes, the
20 testing showed that.

21 Q I apologize for cutting you off there.

22 MR. BIBB: One moment, your Honor.

23 Q (By Mr. Bibb) Is the monitor CPU source code
24 important?

25 A I would say that if you wanted to prove the system

1 was safe, first you would have to make sure everything else
2 was safe and then you would have to look at the monitor
3 source code. So I consider it important because if there is
4 a software defect in the source code that makes the system
5 unsafe then that's it, it is unsafe.

6 If you don't have the monitor CPU source code, you
7 don't know whether that potential source of hazards has been
8 eliminated.

9 Q Okay.

10 MR. BIBB: One moment, your Honor. I believe, Mr.
11 Koopman, you can probably catch your plane.

12 Thank you so much, Dr. Koopman, I appreciate your
13 coming. No further questions. Your witness.

14 THE COURT: Redirect.

15 MR. PORTIS: Yes, ma'am.

16 REDIRECT EXAMINATION

17 BY MR. PORTIS:

18 Q Dr. Koopman, I want to clear up something about your
19 role in this case for the jury. Your role in this case was
20 to evaluate software and the hardware on this particular
21 Toyota Camry, correct?

22 A That's correct.

23 Q Your role, and ultimately what you determined, am I
24 right, is what?

25 A I determined that it's unsafe and defective.

1 Q You understand that other experts will testify about
2 causation; am I right?

3 A That's my understanding. Yes.

4 Q You understand that Mr. McCort already testified in
5 this case and provided his accident reconstruction and
6 provided causation opinions in terms of the throttle being
7 open, the emergency brake being pulled, and that is not your
8 role, right?

9 A That is my understanding on both counts.

10 Q And you understand Mr. Barr will also talk about
11 causation issues, correct?

12 A Yes. That is my understanding.

13 Q So that's just not your role, but I think did -- but
14 I think what you did testify about is that your opinions are
15 consistent with the facts as you know them in this case; is
16 that right?

17 A That is correct.

18 Q Can you describe that, please.

19 A So what my testimony says is that it's defective,
20 it's unsafe. And unsafe in this context means can
21 reasonably be expected to produce unintended acceleration
22 due to one of these faults happening. And from reading the
23 deposition of Ms. Bookout and reading about the accident,
24 there is nothing that I saw in there that precludes software
25 or hardware defect from having caused this accident.

1 Q Do UA event occur in Toyota Camry vehicles?

2 A I think it is pretty clear that UA events occur.

3 Yes.

4 Q What is the Van Alfen case about?

5 A The Van Alfen case was about.

6 MR. BIBB: Objection, your Honor. I didn't go into
7 any of the facts of those cases. They brought up the name
8 of the case.

9 (The following bench conference was had outside the
10 hearing of the jury:)

11 MR. BIBB: I didn't bring up the facts of that
12 case. They interjected the names. I was trying to be so
13 careful about saying a prior report, as we previously
14 discussed we would handle that. And they interjected this.
15 I don't think they get to open the doors themselves.

16 THE COURT: Didn't you question him about some of
17 his result in the Van Alfen? Shouldn't he be able to tell
18 them? Which report were you critiquing him on for having
19 replied on that Barr issue?

20 MR. BIBB: It is in the Van Alfen case. But I
21 began by referring to it until they asked what case,
22 deposition is it from, then he interjected the name of the
23 case.

24 THE COURT: Weren't you asking him specifically
25 about his findings in this case?

1 MR. BIBB: I was. In all three cases he relies on
2 all this work for his opinions in this case.

3 THE COURT: I will allow just very limited on the
4 facts.

5 (Within hearing of the jury:)

6 Q (By Mr. Portis) What are the facts as you know them
7 in the Van Alfen case?

8 A It has been a while, but as I recall Mr. Van Alfen
9 and three passengers were driving on a highway, and they got
10 off on an exit ramp, and they were unable to stop the
11 vehicle despite applying brakes. Witnesses actually saw
12 brake lights. And there were unfortunately two fatalities.
13 So coming off an off-ramp on an interstate highway and then
14 they crashed into an embankment at the end of the off-ramp

15 Q What do you understand the facts to be in the St.
16 John case?

17 A In the St. John case, it was -- it was more of an
18 issue of she was at a stop sign, and she released her foot
19 from the brake, and it took off through the schoolyard and
20 ultimately hit a brick -- went through chain-link fence, hit
21 a tree, and crashed into a brick pillar.

22 Q Now, we talked -- he showed some -- I can't remember
23 his name here, cohort at Carnegie Mellon who does
24 statistics?

25 A Fischbeck, I believe.

1 Q Thank you. What are statistics?

2 A You're out of my area.

3 Q Okay. I won't ask.

4 A Has to do with numbers.

5 Q Let me give you a number. During -- Mr. Lentz is the
6 president of Toyota Motor Sales. He testified that there
7 was a 400 percent increase in Camry unintended acceleration
8 events during the introduction of the electronic throttle
9 control system. Would that number surprise you based on
10 what you observed?

11 A Based on what I've seen, that would be no surprise at
12 all.

13 Q Now, the NASA report, I want to talk about that
14 because he showed a few things about the NASA report. Is it
15 without question that NASA found a single point of failure
16 in the Toyota system?

17 A This is no question in my mind that they found and
18 reported upon a single point failure in the Toyota ETCS.

19 Q And any system that has a single point of failure
20 what is the problem with it?

21 A Problem is it is unsafe.

22 Q Now, he asked you some questions, and he says that in
23 their systems that sometimes -- he used the word sometimes
24 -- the power is cut. Did you have any difficulty with the
25 word "sometimes" in relation to a critical safety system?

1 A Sometimes doesn't cut it. If you're exposed for
2 hundreds of millions of miles saying, well, it is only every
3 10 million miles, that is not good enough. You to have
4 extraordinarily high scientific notation once in -- so for
5 airplanes, for cars too, they use numbers like once in every
6 billion hours it is okay for something bad to happen, once
7 in every billion, with a B hours. That depends if that is
8 sometimes or not. Most people's idea of sometimes is a lot
9 more frequent than that.

10 Q Then he asked you some questions about testing that
11 was by a Toyota expert and by Mr. Barr. Did I understand
12 correctly in tests run by Toyota experts and tests run by
13 Mr. Barr that UA events occurred during those tests?

14 A That's my interpretation of the test results. Yes.

15 Q I want to show you page 65. He showed it to you and
16 you wanted to point out something, and I wanted to give you
17 the opportunity to do that. This is -- tell me what you
18 wanted to point out, sir.

19 A So what I wanted to point out was that these
20 failsafes are in the same fault containment region as the
21 software that is presumably making the system unsafe. So,
22 yes, they have failsafes, and there are these counter
23 measures pressing the brake. This is all after the UA
24 happened and you're trying to prevent it from getting worse,
25 from being an accident. You want to bring the vehicle to a

1 stop.

2 But what is happening is all these and gates -- you
3 see these ands -- all three things have to be a problem, but
4 they're all being controlled by the same place. From a
5 fault-tree point of view, it is not a proper fault tree,
6 because it is one place that can make all the and gate
7 things go bad; that's what I wanted to point out.

8 Q Thank you. I guess after the vigorous
9 cross-examination are any of your opinions on pages 1, 2, 3
10 that you provided testimony on today, have they changed in
11 any way?

12 A I would not change my opinions one bit.

13 MR. PORTIS: Thank you, your Honor.

14 THE COURT: Dr. Koopman, you may step down, sir.
15 do we have a witness we can do in 45 minutes?

16 MR. BAKER: Pretty close.

17 THE COURT: Members of the jury, do you want to
18 stick around for 45 minutes?

19 (All jurors respond in the affirmative.)

20 THE COURT: What witness are we calling?

21 MR. BAKER: Keiichi Osawa, K-E-I-I-C-H-I O-S-A-W-A.

22 MR. TAWWATER: Now that the jury knows it is a
23 video do they want to reconsider?

24 THE COURT: No, too late.

25 (Whereupon, an off-the-record discussion was had.)

1 THE COURT: Ladies and gentlemen, it is 4:20.
2 we're going to break for the day. And, again, I want to
3 emphasize to you: Do not do anything at all over the
4 weekend to do any research on this case. You have heard the
5 names of other cases mentioned today. You're to do
6 absolutely nothing. Should there be any news reports, any
7 newspaper reports -- I know my office has received some
8 phone calls about this case. Do not read anything
9 whatsoever about this case or any other case that may
10 involve these issues.

11 With that said, I wish you a good weekend. And we
12 will see you Monday morning at 9:00. All rise while the
13 jury exits.

14 (Whereupon, the jury exits the courtroom.)

15 THE COURT: We're back on the record.

16 MR. TEAGUE: Your Honor, I want to renew our motion
17 that was previously filed to exclude the testimony of Dr.
18 Koopman. He testified while ago that his role in this case
19 was to evaluate the software and provide an opinion that it
20 was unsafe and defective. His safety analysis is an unsound
21 unreliability methodology. In fact, his methodology is his
22 own method, as he testified to, which is the same thing he
23 is critical of Toyota for.

24 With respect to this case, he has not inspected the
25 Bookout vehicle, he has not been to the scene. He has not

1 inspected the actual software which is at issue which he
2 wants to opine on as being unsafe and defective. He has
3 done no testing. He admits that the mitigation safe guards
4 that are built within the Toyota software have worked every
5 single time and have defaulted to a failsafe when tested.

6 He admitted that he could not say that it was more
7 probably true than not that any defect in the software was
8 related to this accident. Moreover, any opinions that he's
9 providing were based on testing of Barr, which he
10 acknowledged the testing was wrong. This is exactly the
11 type of testimony that should be excluded. He came in here
12 today and he said, It's unsafe and it is defective because I
13 said so, and he doesn't have the foundation to provide that
14 opinion.

15 THE COURT: Okay. Do you want to say anything
16 other than adopt what you had in your motions in limine?

17 MR. BAKER: I just adopt what we put in our motions
18 in limine and oral argument that we already had on the
19 motions, your Honor.

20 THE COURT: I will overrule your objection. And we
21 need to talk about exhibits.

22 MR. BAKER: We would offer MISRA-C 3106.

23 MR. BIBB: Only for identification. It is a
24 learned treatise.

25 THE COURT: What is 3106? What is it.

1 MR. BAKER: MISRA-C guideline.

2 THE COURT: Oh.

3 MR. BIBB: They're certainly not a statute or a
4 standard or anything more than guidelines which have got to
5 be treated as a learned treatise, I believe.

6 MR. PORTIS: They are standard.

7 MR. BIBB: Not adopted by any governmental agency
8 that I'm aware of.

9 MR. PORTIS: They're not a treatise.

10 MR. BIBB: And the uncontroverted testimony is that
11 only five manufacturers even follow them.

12 MR. PORTIS: Well, that is true. But that's --

13 MR. BIBB: And they're not required to follow those
14 guidelines, your Honor. It is just a learned treatise.

15 THE COURT: Remind me: Is learned treatise not an
16 exception to the hearsay rule?

17 MR. BIBB: That's why I said you can mark it for ID
18 but it doesn't go to the jury.

19 THE COURT: Let me ask: Are we going to do all
20 documents that the experts have relied upon and send them to
21 the jury, or is there an independent basis other than he
22 relied upon this?

23 MR. PORTIS: For instance -- well, maybe it does.
24 But I think it goes back for a different purpose. This is
25 -- there are documents that, SAE papers they were asking Mr.

1 McCort about that are part of a -- that are part of some
2 sort of papers that are generated.

3 MR. BIBB: I take that back. It is a little
4 different than the federal. If admitted they may be read
5 into evidence, but may not be received as exhibits.

6 THE COURT: Where are you reading?

7 MR. BIBB: Learned treatise exception, which one it
8 is 2803.18. It says they can be shown to the witness and
9 cross-examination, relied upon the witness in direct
10 examination. But then it goes on to say if admitted they're
11 not to be received as exhibits.

12 MR. PORTIS: This is referring to --

13 MR. BIBB: Learned treatises.

14 THE COURT: Treatises, periodicals or pamphlets.

15 MR. PORTIS: I don't think it is a learned
16 treatises, I think it is this issue. I think this is a
17 standard and guideline that he's talked about. Learned
18 treatise would be something from SAE.

19 MR. BIBB: I don't think this is any different.
20 This is from whatever the Motor Industry Software
21 Association --

22 MR. PORTIS: It is in evidence. The question is
23 whether it goes back to the jury or not, and we would say it
24 does, they say it doesn't. I don't think it is a learned
25 treatise, but they think it is. I'm not real sure if that

1 is defined or not and would leave it to up to the court's
2 discretion on that.

3 THE COURT: Let me come back to that. I will
4 reserve that. What else do we have?

5 MR. PORTIS: We have Exhibit 4229, which is a paper
6 by Mr. Kawasaki (phonetic) which is normally a learned
7 treatise but it is from a Toyota employee.

8 MR. BIBB: I think it is probably an admission,
9 frankly, Judge.

10 THE COURT: 4229 will be admit.

11 MR. PORTIS: This is Exhibit 5696. Really what I
12 was going -- this, again, is another Toyota document, part
13 of overall group. I don't mind just pulling out the one
14 document, or we can get the whole document.

15 MR. BIBB: I want the whole document in.

16 THE COURT: What number, 5669, and the whole thing
17 is coming in. Court will admit Plaintiffs' Exhibit No.
18 5696.

19 MR. PORTIS: This is Exhibit 5682A.

20 MR. BIBB: This is probably is a learned treatise.

21 THE COURT: 5682A.

22 MR. PORTIS: I'm fine if we just don't put that
23 back.

24 THE COURT: Do you want to withdraw it.

25 MR. PORTIS: Just that it's an exhibit but not sent

1 back to the jury.

2 THE COURT: Do you want me to mark it as a court
3 exhibit?

4 MR. BIBB: I think so.

5 THE COURT: I will tell you, I normally don't have
6 a request to put the learned treatises in as court's
7 exhibits. I'm happy to do it if you think you need it for
8 appeal.

9 MR. BIBB: I think we probably have to have that
10 for report for the record. Sorry, your Honor.

11 THE COURT: That's fine. So I will mark both as
12 Court's 4. I don't know that the court's exhibits -- so I'm
13 marking this entire document.

14 MR. ESDALE: That's appropriate.

15 MR. PORTIS: This is again -- I don't know what
16 you're doing with CVs.

17 THE COURT: Marking those as exhibits.

18 MR. PORTIS: That is Exhibit 5648.

19 THE COURT: Is there an objection to his CV, Mr.
20 Bibb?

21 MR. BIBB: I think we treat it the same way we did
22 Mr. McCort marked as an exhibit but it doesn't go to the
23 jury.

24 THE COURT: Okay. I didn't know that. Because you
25 specifically wanted somebody's CV.

1 MR. ESDALE: I thought it was you that said they
2 didn't go back.

3 THE COURT: No.

4 MR. BIBB: What is the court's general practice on
5 that?

6 THE COURT: The general practice is that the CVs go
7 back because generally my attorneys will waive going through
8 all of the background because the CVs are there.

9 MR. BIBB: That is fine. I certainly think they
10 need to be there for the record on appeal.

11 MR. PORTIS: That is a learned treatise.

12 THE COURT: Wait just a minute. Court is also
13 admitting Plaintiffs' 5648, which is the CV of Mr. Koopman.
14 And then this is another learned treatise?

15 MR. PORTIS: Yes, ma'am, 5670.

16 THE COURT: So the court is marking Plaintiffs'
17 Exhibit No. 5670. But the court is marking it as Court's
18 Exhibit 5, the learned treatise that is styled design -- or
19 titled *Design by Extrapolation and Evaluation of Fault*
20 *Tolerant Avionics*. And that's number 5.

21 Just for the record, number 4 the court marked as a
22 court's exhibit is a document from the National Highway
23 Traffic Safety Administration on the reported Toyota Motor
24 Corporation unintended acceleration investigation as well as
25 the appendix A software.

1 MR. PORTIS: The Exhibit 5649 is the MISRA
2 guidelines.

3 THE COURT: And I assume they will be the same
4 objection.

5 MR. BIBB: Same objection.

6 THE COURT: Okay.

7 MR. PORTIS: Then we have two more. Exhibit 5693.

8 MR. BIBB: No objection.

9 THE COURT: Court will admit Plaintiffs' Exhibit
10 No. 5693.

11 MR. BIBB: And they have 5692. Our objection is to
12 its translation because I think it is one of their
13 translations.

14 MR. PORTIS: It is a certified translation, your
15 Honor.

16 THE COURT: The court will admit -- is this one of
17 the e-mails?

18 MR. PORTIS: It is something he talked about that
19 was part of his presentation that he relied upon.

20 THE COURT: And it has the certified translation?

21 MR. PORTIS: Yes, ma'am.

22 THE COURT: The court will admit Plaintiffs'
23 Exhibit No. 5692.

24 MR. BIBB: I have 260.1 is the video that was
25 showed the other day. And I understand we already have a

1 ruling on that. To lay some more foundations for its
2 admission.

3 THE COURT: This is the Cooper study video that
4 they played.

5 MR. BIBB: It was 260.1 that differentiated from
6 the written report. I also note it is 5755 on the
7 plaintiffs' exhibit list, but we can use ours.

8 THE COURT: This is one that I am reserving to see
9 if we will admit it.

10 MR. ESDALE: While we're on the subject, your
11 Honor, if I can, this is -- the Koopman study, I don't
12 believe anyone would argue would be considered if not a
13 learned treatise a reliable authority. It was relied upon
14 by the experts, and this is part of the Cooper study. And
15 as a result, it -- we should be treated just like the
16 learned treatises and reliable authorities, it should not
17 got to the jury for that very reason. Again, it is part of
18 the Cooper study.

19 THE COURT: Okay. So you're basically making the
20 same argument that he is making on these MISRA reports they
21 should all be treated as --

22 MR. ESDALE: Reliability authority.

23 MR. BIBB: I would like to do research on that
24 because I think it should come in, separate and apart. It
25 is the background for -- there is no statement. I don't

1 think it fits as a learned treatise there. It is a video
2 that, frankly, the plaintiffs' counsel paid the research to
3 be done? And it may come in as a representative admission.

4 THE COURT: Let me ask would these all be hearsay
5 if it wasn't the fact that an expert was relying on them?

6 MR. CLARK: There is no statement. The rule
7 defines the statement as an oral assertion; it certainly is
8 not that.

9 THE COURT: Is it a learned treatise? It is
10 certainly a statement.

11 MR. CLARK: No, it's not a statement. Because
12 conduct is only a statement where the conduct is intended by
13 a person as an assertion. That is 2801(A)(1)(C.) And I
14 don't think there it is any argument that anybody can make
15 with a straight face that the conduct on that video was
16 intended by the declarants as an assertion.

17 MR. BAKER: That's why you want a foundation laid.

18 MR. PORTIS: I would say this: The problem is
19 completeness. Because the testimony in the case is there
20 were hundreds of these tests run, and there was one, there
21 was one where there was a pedal misapplication out of the
22 hundreds and hundreds of tests run.

23 THE COURT: Do we have the entire test?

24 MR. PORTIS: I don't. If we're going to submit
25 then let's put them all on a DVD.

1 THE COURT: So your objection is learned treatise
2 and it is not complete.

3 MR. PORTIS: That's correct.

4 THE COURT: All right. I will note the objections.
5 I'm not ruling on anything today.

6 (Whereupon, court stood in recess until October 14,
7 2013.)

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1 STATE OF OKLAHOMA)
2 COUNTY OF OKLAHOMA)

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4 C-E-R-T-I-F-I-C-A-T-E
5

6 I, Karen Twyford, Certified Shorthand Reporter, in
7 and for the County of Oklahoma, State of Oklahoma, do hereby
8 certify that the foregoing transcript is a true, correct,
9 and complete transcript of my stenographic notes.

10 I further certify that I am not related to any of
11 the parties herein, nor am I interested in any way in the
12 outcome of these proceedings.

13 WITNESS my Hand this _____ day of _____,
14 2013.
15
16
17

18 _____
19 KAREN TWYFORD
20 CERTIFIED SHORTHAND REPORTER
21 CERTIFICATE NO. 01780
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